

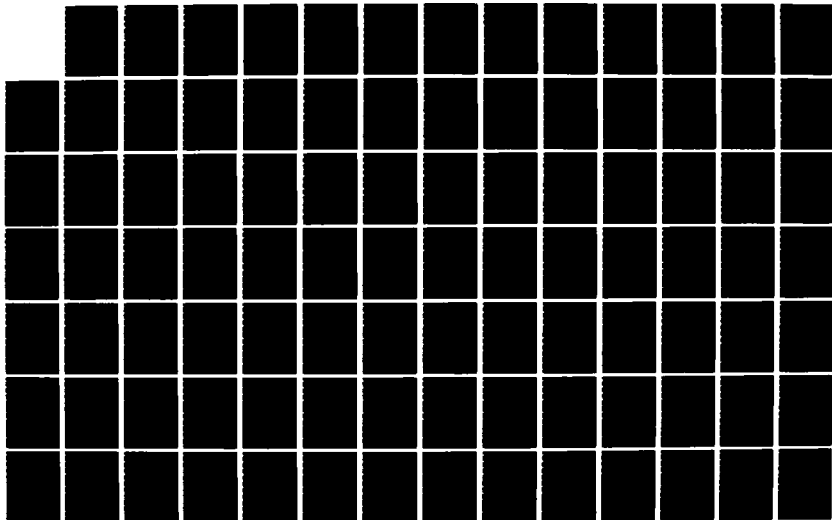
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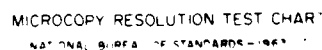
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## AD-A181 164

AFGL-TR-85-0162



Catalog of Low Resolution Infrared Spectra:  
Field-Widened Interferometer - Sergeant A30.276

by

R.H. Haycock, V.A. Thurgood, A.J. Steed, and C.R. Harris

Space Dynamics Laboratories  
Utah State University UMC-4140  
Logan, Utah 84322

26 June 1985

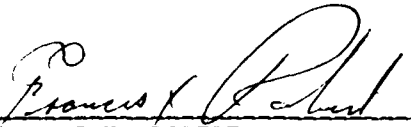
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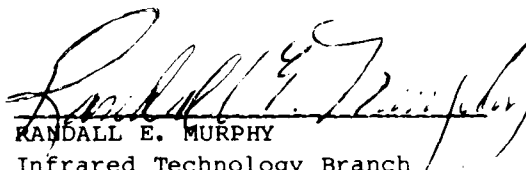
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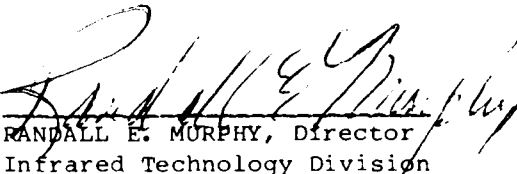
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"This technical report has been reviewed and is approved for publication"

  
FRANCIS X. ROBERT  
Atmospheric Backgrounds Branch  
Infrared Technology Division

  
RANDALL E. MURPHY  
Infrared Technology Branch  
Infrared Technology Division

FOR THE COMMANDER

  
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FIELD	GROUP	SUB GR		
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19. ABSTRACT (Continue on reverse if necessary and identify by block number) A Sergeant Rocket (APO-276) instrumented with a cryogenically-cooled, Michelson IR Interferometer was launched 13 April 1983 from the Poker Flat, Alaska Research Range. The purpose of the flight was to measure IR emission spectra in the 2 - 7.5 $\mu$ m region. The flight was extremely successful and provided first-resolved spectra of carbon monoxide (CO) near 4.1 $\mu$ m and 4.6 $\mu$ m, methane (CH <sub>4</sub> ) near 4.3 $\mu$ m. Further, the data from this flight provided the first resolved spectra of atmospheric emitters as a function of altitude. These data include first-resolved spectra of carbon dioxide (CO <sub>2</sub> ) near 4.1 $\mu$ m, and first-resolved spectra of water (H <sub>2</sub> O) near 4.3 $\mu$ m.  The report catalog of the spectra obtained during the flight and the associated data with which the spectra were obtained are included in the report.				
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# LIST OF CONTRIBUTORS

## Utah State University

Allan J. Steed, Principal Investigator

G.D. Allred  
J.C. Ballard  
D.J. Baker  
K.D. Baker  
D.R. Bunnell  
K.B. Davis  
P.J. Espy  
D.C. Goode  
C.R. Harris  
R.H. Haycock  
L.C. Howlett  
V. King  
V.A. Thurgood  
J.C. Ulwick

## Defense Nuclear Agency

Wm. McKeckney, Col.

## Air Force Geophysics Laboratory

F. Cook  
S. Hoskins  
A. McIntyre  
R. Murphy  
A.T. Stair, Jr.  
R. Straka



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* 2	83.1	88.4- 88.7	7
* 3	83.6	88.9- 89.2	9
* 4	86.4	91.5- 91.9	11
* 5	86.9	92.0- 92.3	13
* 6	89.6	94.6- 94.9	15
* 7	90.1	95.0- 95.3	17
* 8	92.9	97.5- 97.8	19
* 9	93.4	98.0- 98.3	21
* 10	96.2	100.4-100.6	23
* 11	96.6	100.8-101.1	25
* 12	99.4	103.1-103.4	27
* 13	99.9	103.5-103.8	29
* 14	102.7	105.7-106.0	31
* 15	103.2	106.1-106.4	33
** 16	105.9	108.3-108.5	35
* 17	106.4	108.7-108.9	37
18	109.2	110.7-111.0	39
19	109.7	111.1-111.3	41
20	112.5	113.1-113.3	43
21	113.0	113.4-113.6	45
22	115.7	115.3-115.5	47
* 23	116.2	115.6-115.9	49
24	119.0	117.4-117.7	51
25	119.5	117.8-118.0	53
* 26	122.2	119.5-119.7	55
* 27	122.7	119.8-120.0	57
28	125.5	121.4-121.6	59
29	126.0	121.7-121.9	61
30	123.7	123.3-123.4	63
31	124.7	123.5-123.7	65
32	132.0	125.0-125.2	67
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35	135.7	126.4-126.6	73
36	137.5	128.2-128.3	75
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# LIST OF ILLUSTRATIONS

Interferometer Spectra - Intensity (watts/cm-ster) vs. Wavenumber (cm<sup>-1</sup>)

File No. <sup>†</sup>	Appr. Elapsed time (sec)	Alt. Range (km)	Page
39	142.3	129.8-130.0	81
** 40	145.0	131.0-131.1	83
41	145.5	131.2-131.3	85
42	148.3	132.2-132.3	87
43	148.8	132.4-132.5	89
44	151.6	133.3-133.5	91
45	152.1	133.5-133.6	93
** 46	154.8	134.4-134.5	95
** 47	155.3	134.5-134.6	97
48	158.1	135.3-135.4	99
49	158.6	135.5-135.6	101
50	161.3	136.2-136.2	103
51	161.8	136.3-136.4	105
52	164.8	136.9-137.0	107
53	165.1	137.0-137.1	109
54	167.8	137.5-137.6	111
55	168.3	137.6-137.7	113
56	171.1	138.1-138.1	115
** 57	171.6	138.2-138.2	117
58	174.3	138.5-138.6	119
59	174.8	138.6-138.6	121
60	177.6	138.9-138.9	123
61	178.1	138.9-138.9	125
62	180.8	139.1-139.1	127
63	181.3	139.1-139.2	129
64	184.1	139.3-139.3	131
65	184.6	139.3-139.3	133
66	187.4	139.3-139.3	135
67	187.9	139.3-139.3	137
68	190.7	139.2-139.2	139
69	191.2	139.2-139.2	141
70	194.0	139.1-139.1	143
71	194.5	139.0-139.0	145
72	197.2	138.8-138.8	147
73	197.7	138.8-138.7	149
74	200.5	138.5-138.4	151
** 75	201.0	138.4-138.3	153

# LIST OF ILLUSTRATIONS

Interferometer Spectra - Intensity (watts/cm-ster) vs. Wavenumber ( $\text{cm}^{-1}$ )

<u>File No.<sup>†</sup></u>	<u>Appr. Elapsed time (sec)</u>	<u>Alt. Range (km)</u>	<u>Page</u>
76	203.8	138.0-137.9	155
77	204.3	137.9-137.9	157
** 78	207.0	137.4-137.4	159
79	207.6	137.3-137.3	161
80	210.3	136.8-136.7	163
* 81	210.8	136.7-136.6	165
82	213.6	136.0-135.9	167
83	214.1	135.9-135.8	169
84	216.8	135.1-135.0	171
85	217.3	135.0-134.9	173
86	219.3	134.4-134.3	175
87	220.6	134.0-133.9	177
88	223.4	133.1-133.0	179
89	223.8	133.0-132.8	181
90	226.6	132.0-131.8	183
91	227.1	131.8-131.7	185
92	229.9	130.7-130.6	187
93	230.4	130.5-130.4	189
94	233.2	129.3-129.2	191
95	234.4	128.8-128.7	193
96	236.4	127.9-127.7	195
97	236.9	127.6-127.5	197
98	239.7	126.3-126.1	199
99	240.2	126.1-125.9	201
100	243.0	124.6-124.5	203
101	243.4	124.4-124.2	205
102	246.2	122.9-122.7	207
103	246.7	122.6-122.4	209
104	249.5	121.0-120.8	211
105	250.0	120.7-120.5	213
106	252.7	119.1-119.8	215
107	253.2	118.7-118.5	217
108	256.0	117.0-116.8	219
109	256.5	116.7-116.4	221
110	259.3	114.8-114.6	223
111	259.8	114.5-114.2	225
112	262.6	112.5-112.3	227

# LIST OF ILLUSTRATIONS

## Interferometer Spectra - Intensity (watts/cm-ster) vs. Wavenumber (cm-1)

<u>File No.†</u>	<u>Appr. Elapsed time (sec)</u>	<u>Alt. Range (km)</u>	<u>Page</u>
113	263.1	112.2-111.9	229
**114	265.8	110.2-109.9	231
*115	266.3	109.8-109.6	233
*116	269.1	107.7-107.4	235
**117	269.6	107.3-107.1	237
118	272.3	105.2-104.9	239
119	272.8	104.8-104.5	241
120	275.6	102.5-102.2	243
121	276.1	102.1-101.8	245
122	278.8	99.7- 99.5	247
123	279.3	99.3- 99.0	249
124	282.1	96.9- 96.6	251
125	282.5	96.5- 96.3	253
126	285.3	93.9- 93.6	255
*127	285.8	93.5- 93.2	257
128	288.6	90.9- 90.6	259
129	289.1	90.4- 90.1	261
130	291.8	87.7- 87.4	263
**131	292.3	87.3- 86.9	265
132	295.1	84.5- 84.1	267
*133	295.6	84.0- 83.6	269
134	298.3	81.1- 80.8	271
135	298.8	80.6- 80.3	273
136	301.6	77.7- 77.3	275
137	302.1	77.2- 76.8	277
138	303.7	75.4- 75.0	279
139	305.3	73.6- 73.2	281
140	308.1	70.5- 70.1	283
141	308.6	69.9- 69.5	285
142	311.3	66.7- 66.3	287
143	311.8	66.2- 65.8	289
144	314.6	62.9- 62.5	291
145	315.1	62.3- 61.9	293
146	317.9	58.9- 58.5	295

\* Denotes high quality spectra.

\*\* Denotes lower quality spectra.

† Data files not designated with \* or \*\* are poor quality.

## 1. INTRODUCTION

In recent years, the United States Air Force has supported several programs which have investigated the chemistry and physics of upper atmospheric energy dynamics. One such program is the Rocketborne Field-Widened Interferometer (RBFWI) program, in which Space Dynamics Laboratories (SDL) at Utah State University participated under contract no. F19628-81-C-0056.

The RBFWI program included the flight of a Sergeant rocket (A30.276) which was launched on 13 April 1983 from Poker Flat Research Range, Alaska into an IBC Class II aurora. The purpose of the flight was to measure emissions from the disturbed atmosphere with high spectral resolution and sensitivity to allow characterization of atmospheric emitters and excitation mechanisms. Specifically, researchers hoped to obtain vertical profiles, time histories, densities, and rotational/vibrational temperatures of certain atmospheric constituents. The prime instrument aboard the payload of A30.276 was a field-widened interferometer designed and fabricated by SDL and sponsored by the Defense Nuclear Agency (DNA) and the Air Force Geophysics Laboratory (AFGL).

The purpose of this scientific report is to catalog the data obtained by the interferometer during the flight of A30.276. It is one of two such catalogs which are in turn members of a series of scientific reports regarding the flight of A30.276 and its related instrumentation.

Other scientific reports prepared under contract F19628-81-C-0056 contain detailed information regarding the field-widened interferometer and other payload and ground based instrumentation used for the flight of A30.276.

Scientific Report No. 5 [Harris et al., 1984] discusses the field-widened interferometer design, data processing, calibration of instrument response, wavenumber calibration, rocket altitude, and chemical compound analyses.

Scientific Report No. 7 [Ulwick et al., 1985] discusses the support instruments aboard A30.276 (the atomic oxygen detector, energy deposition scintillator, and photometers) and data from the supporting ground based instruments.

Scientific Report No. 8 [Zachor et al., 1985] discusses linear least-squares and other data reduction techniques used to analyze spectral data obtained in the RBFWI experiment.

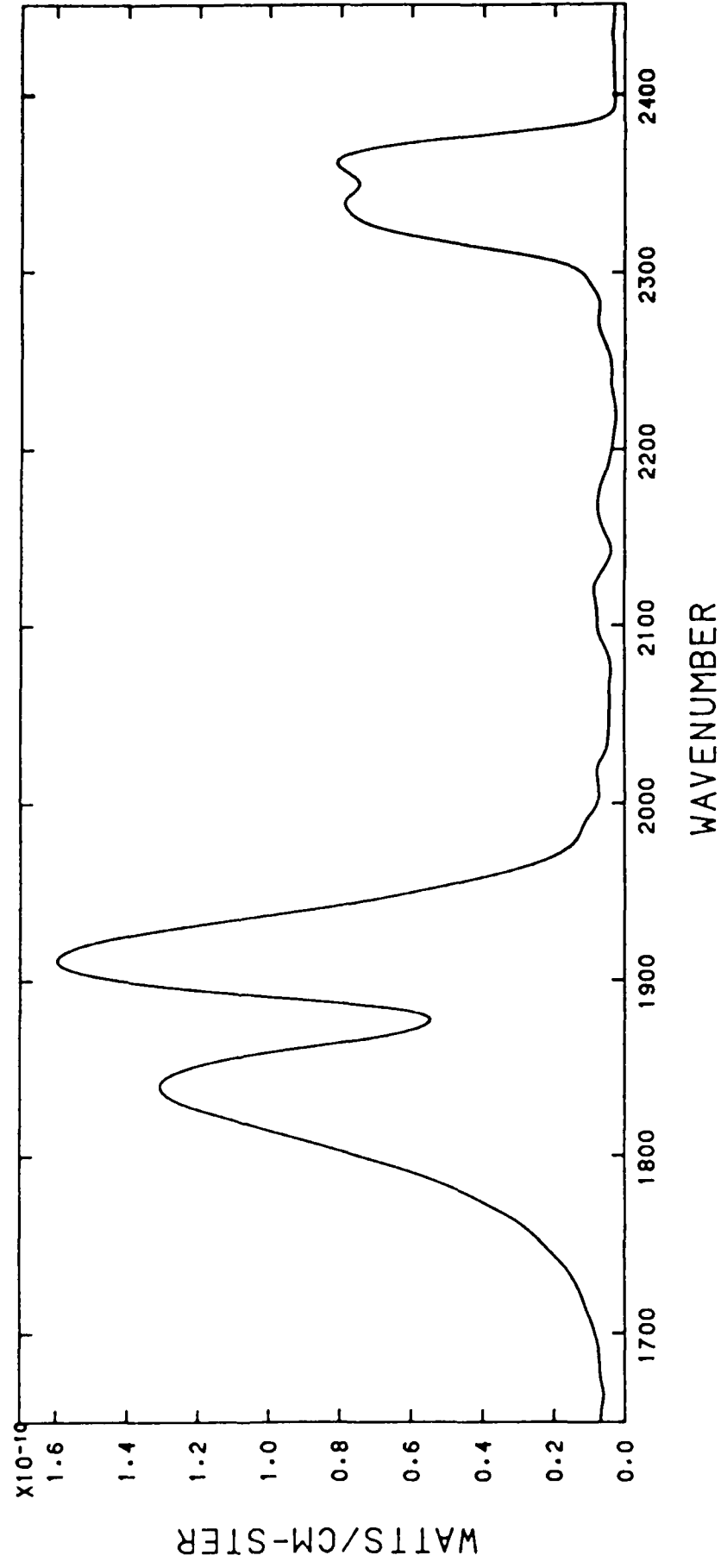
Scientific Report No. 10 [Harris et al., 1985] also catalogs the data obtained during the flight of A30.276. In contrast to this report, Scientific Report No. 10 presents the spectra at a higher resolution.

### 1.1 DATA OVERVIEW

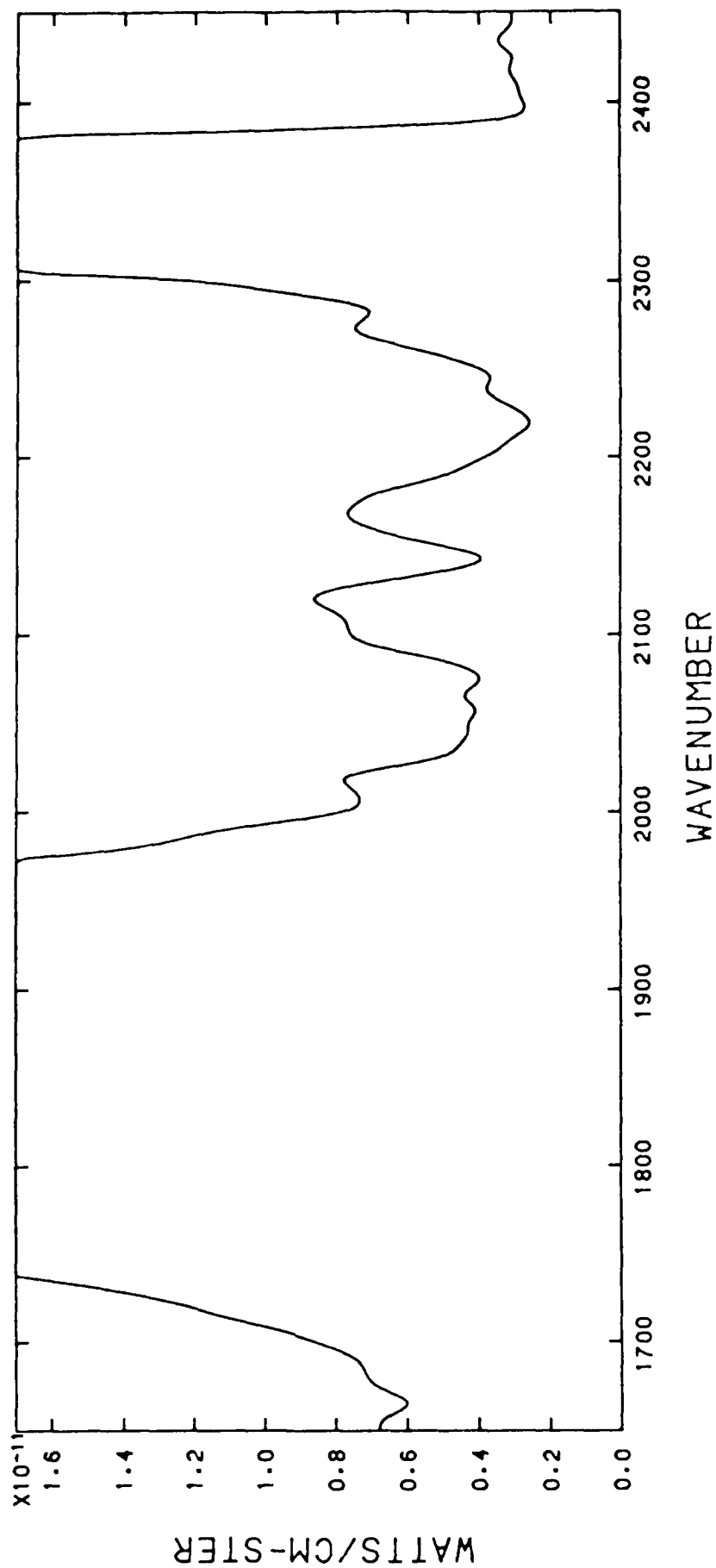
The data cataloged in this report represents the results of performing an 8,000-point Fourier transform on the raw data and then apodizing it using a Hamming function which yielded a full width at half maximum resolution of  $13.1 \text{ cm}^{-1}$ . Each spectrum contained herein constitutes a data file and is composed of two graphs of intensity (watts/cm-ster) vs. wavenumber ( $\text{cm}^{-1}$ ). The second of the two graphs clarifies the lower intensities by exhibiting a factor of ten enhancement on the vertical scale. Each file also includes the data file number, altitude of the interferometer at the time of data acquisition, and the date and time the data was plotted.

Due to an instrument malfunction during flight, only the following data files are of high quality: 1-15, 17, 23, 26, 27, 81, 115, 116, 127, and 133. Files 16, 38, 40, 46, 47, 57, 75, 78, 114, 117, and 131 are of lower quality; the remaining files are of poor quality.

## INTERFEROMETER DATA



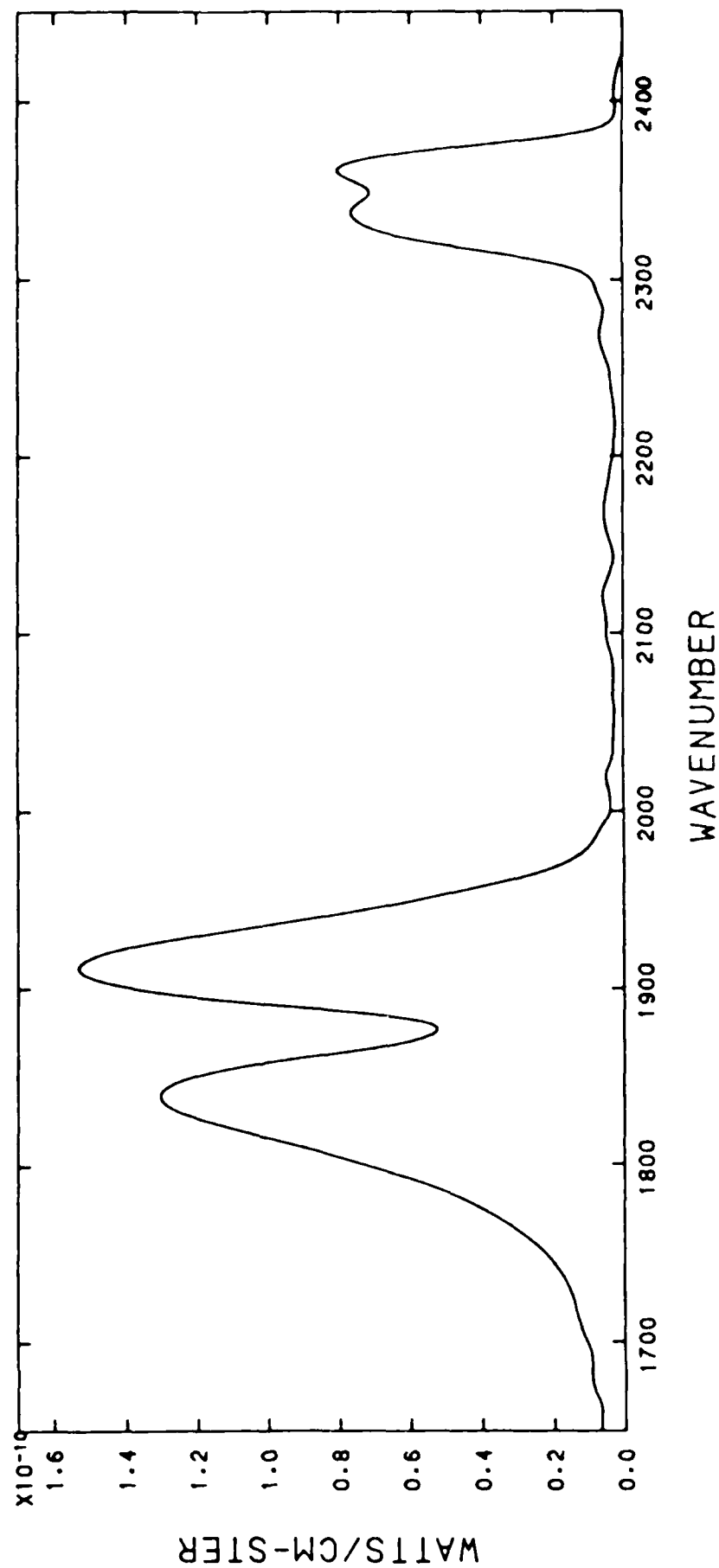
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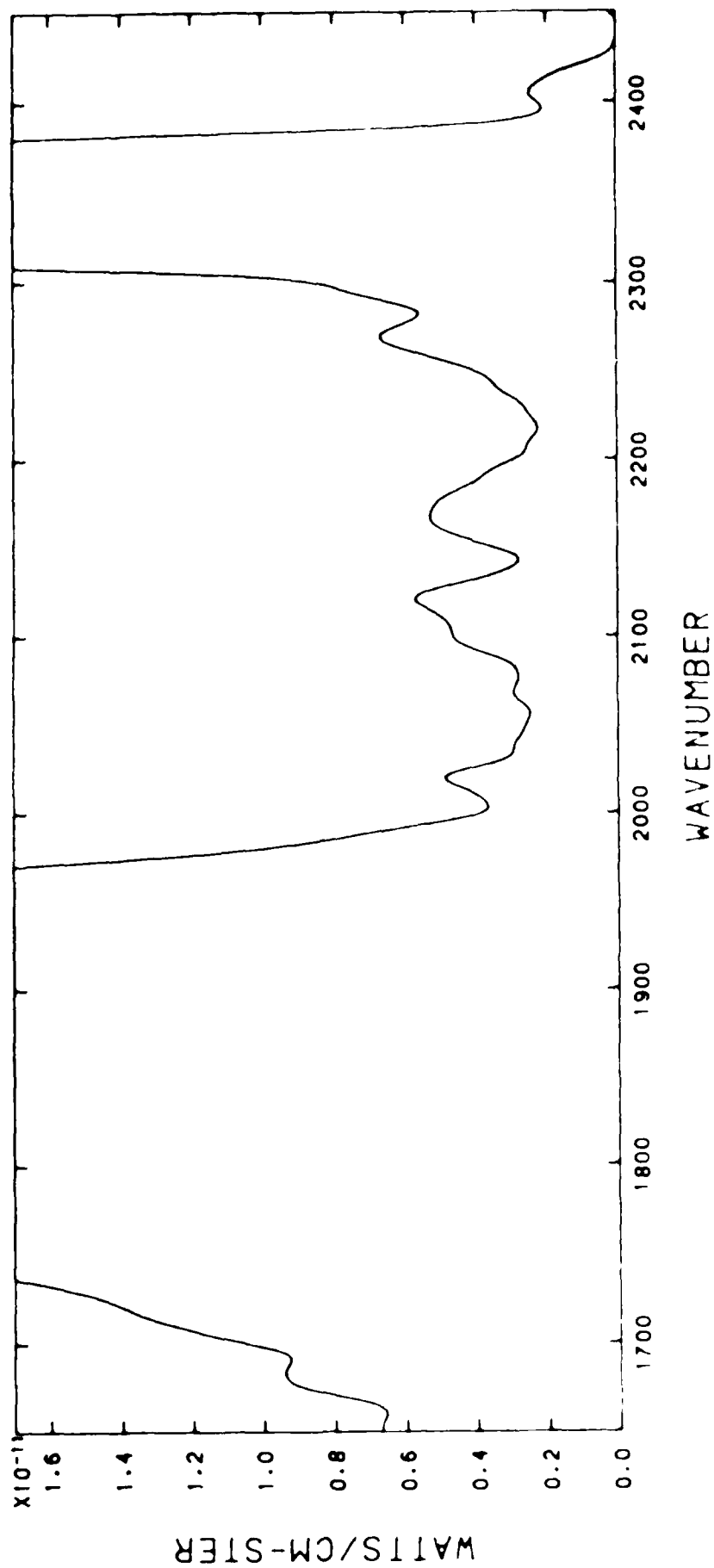
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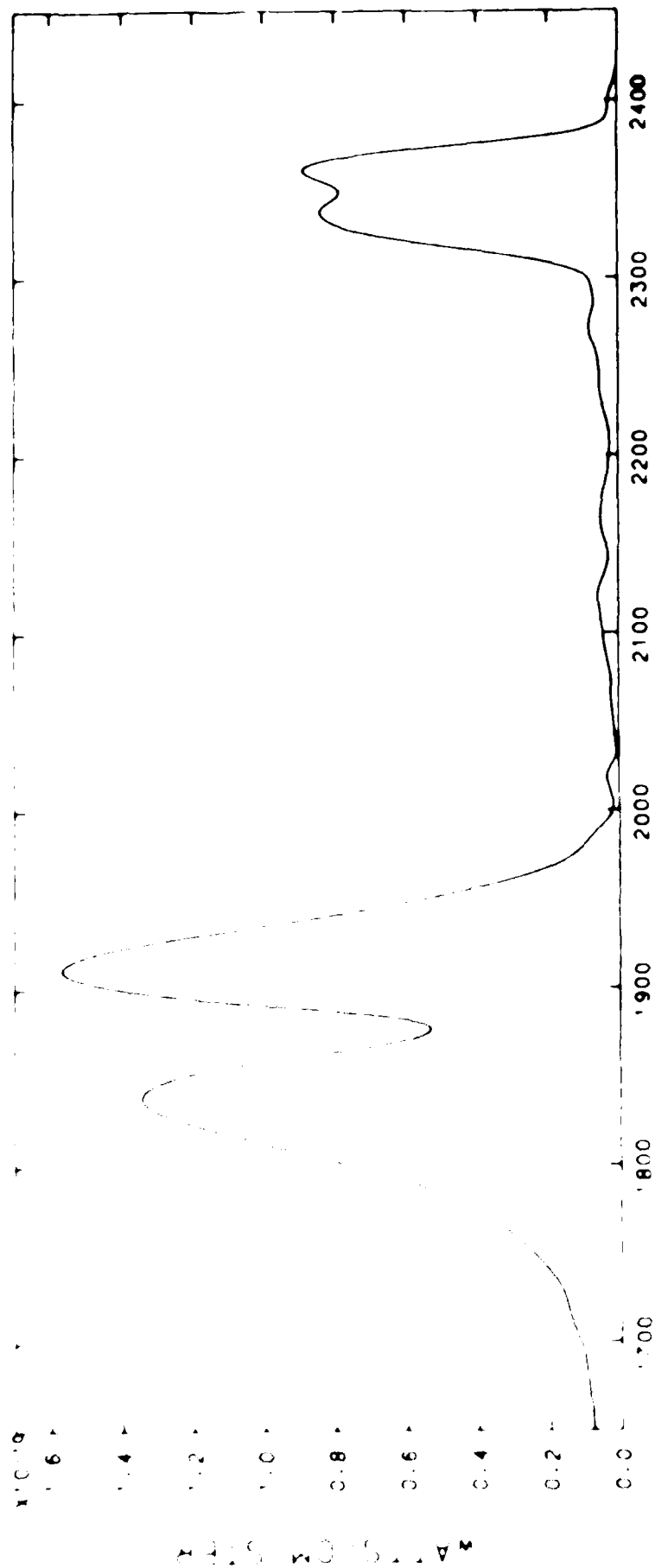




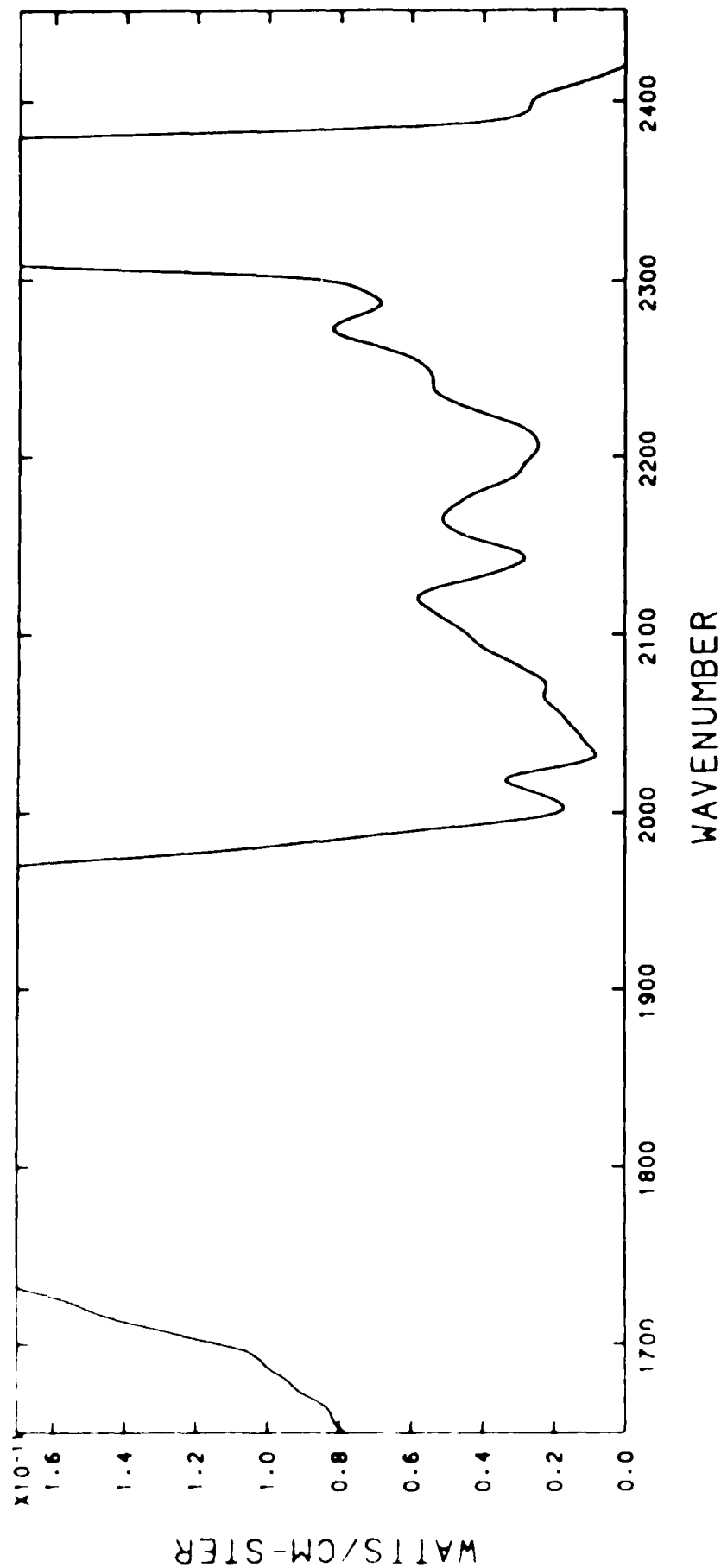
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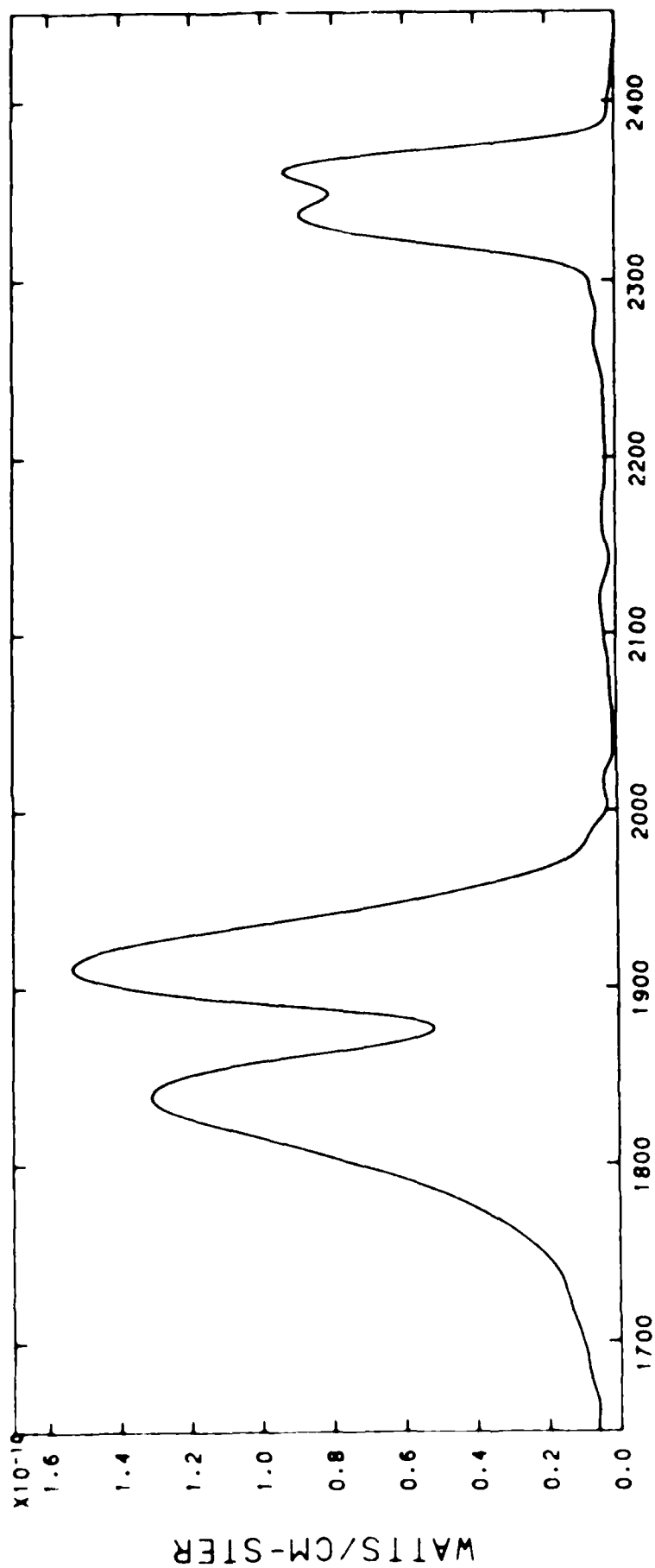
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FILE 3. TIME 9: 7:46.654. ALT 88.9- 89.2 KM

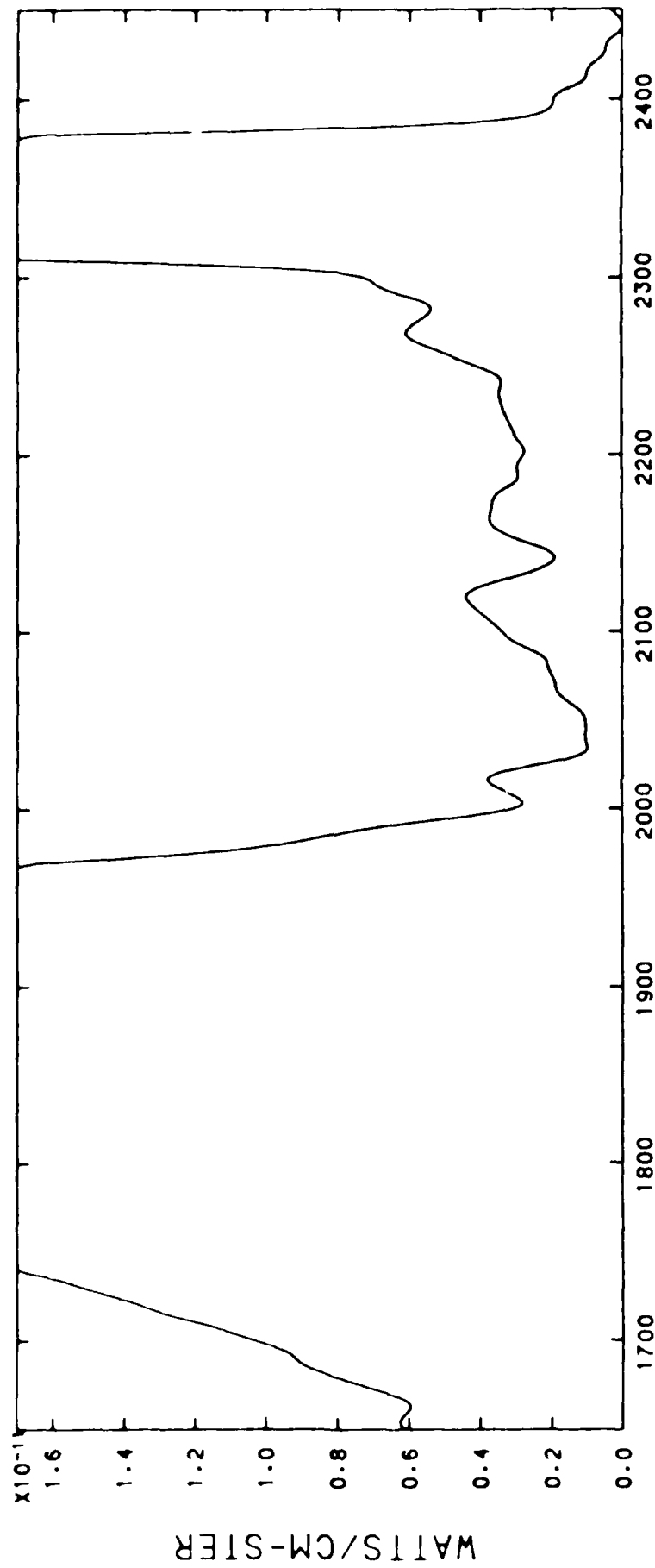


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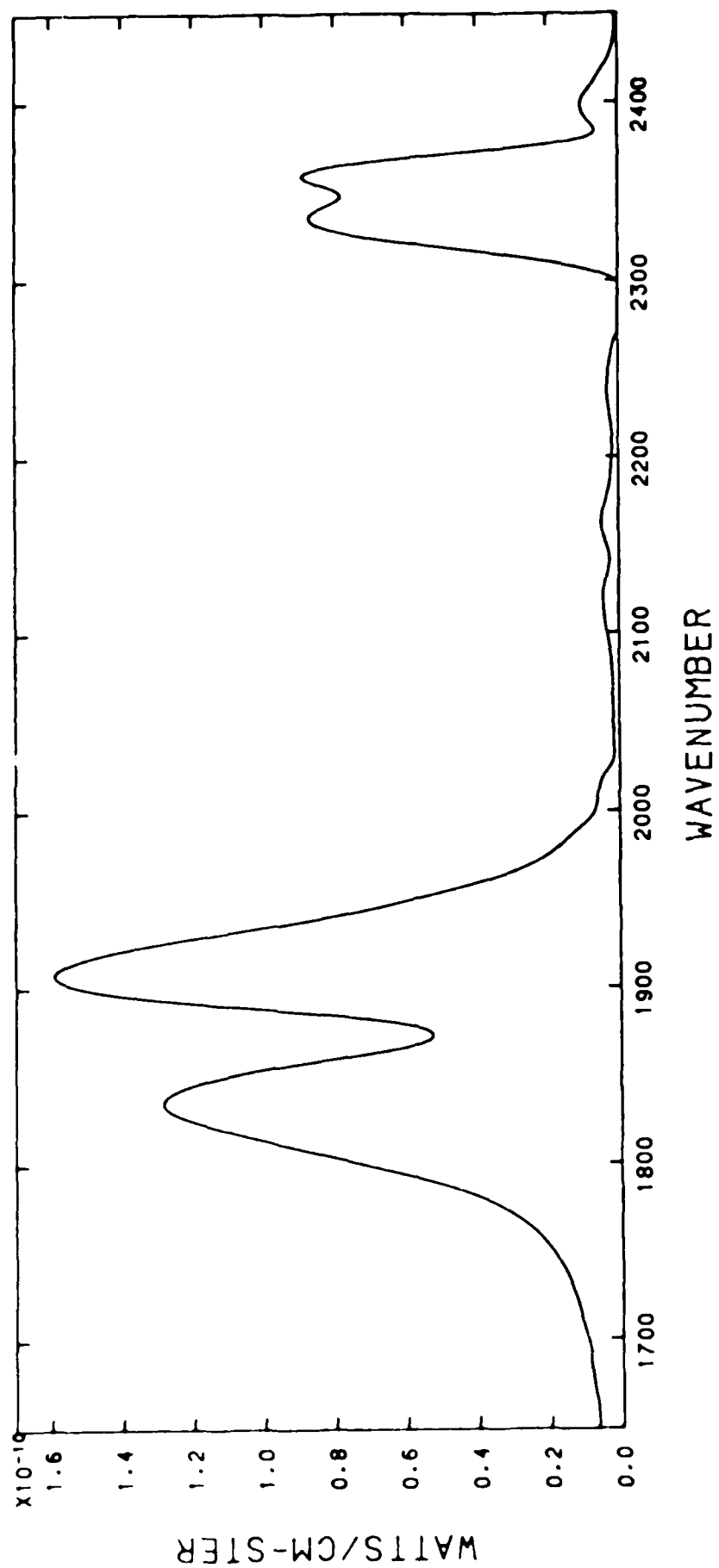
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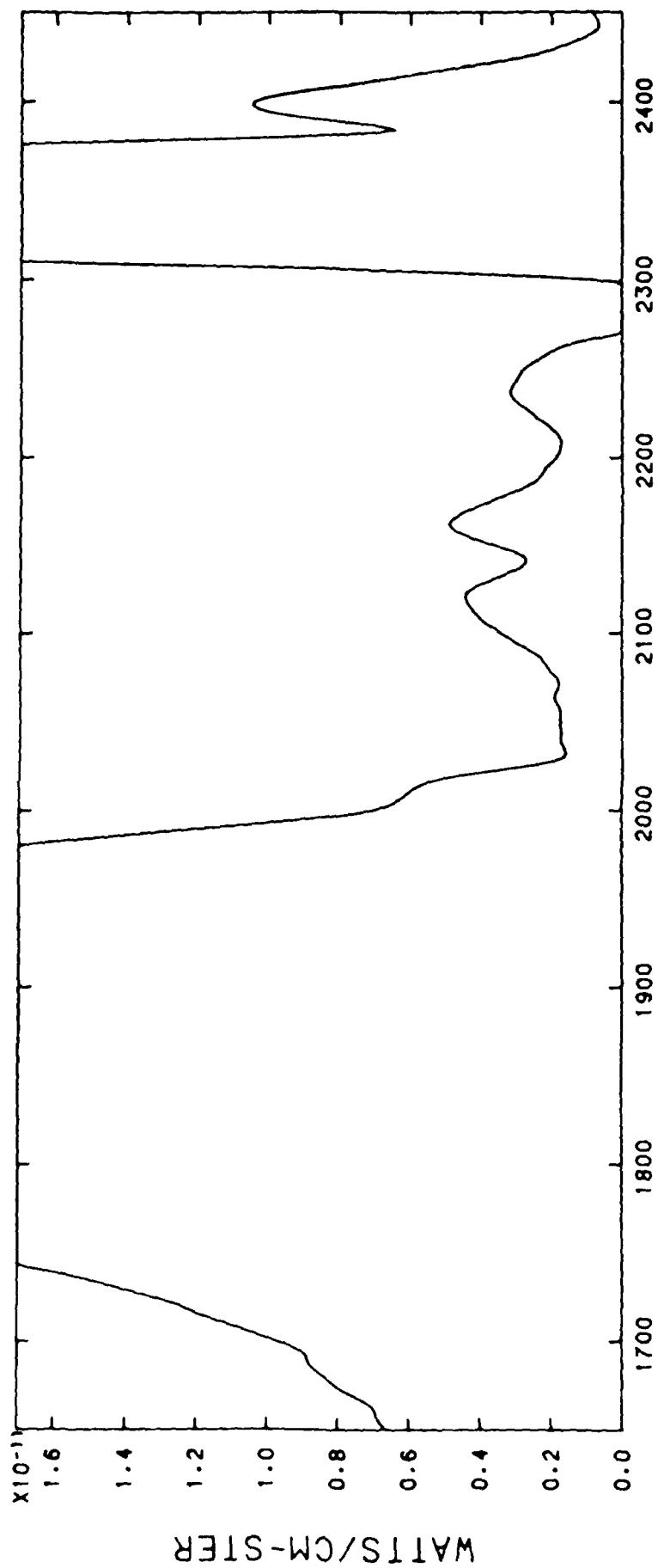


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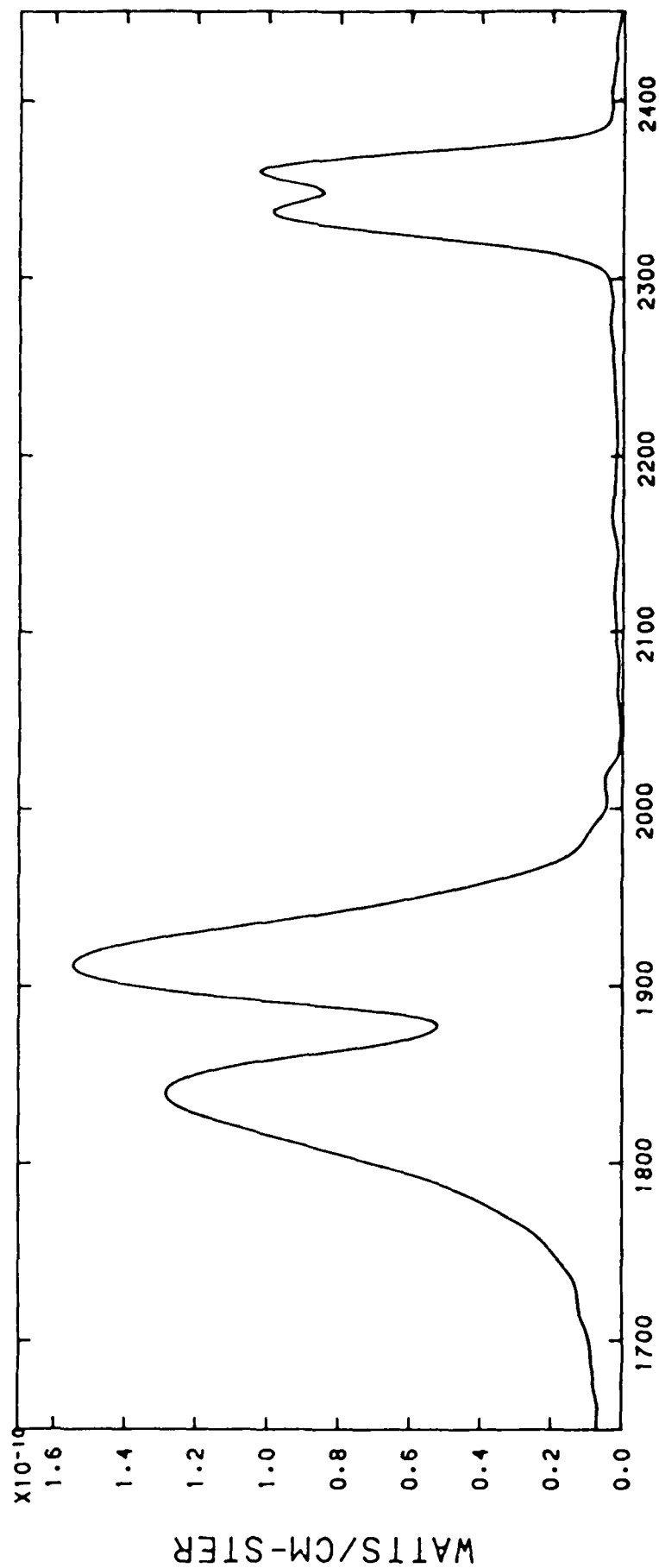
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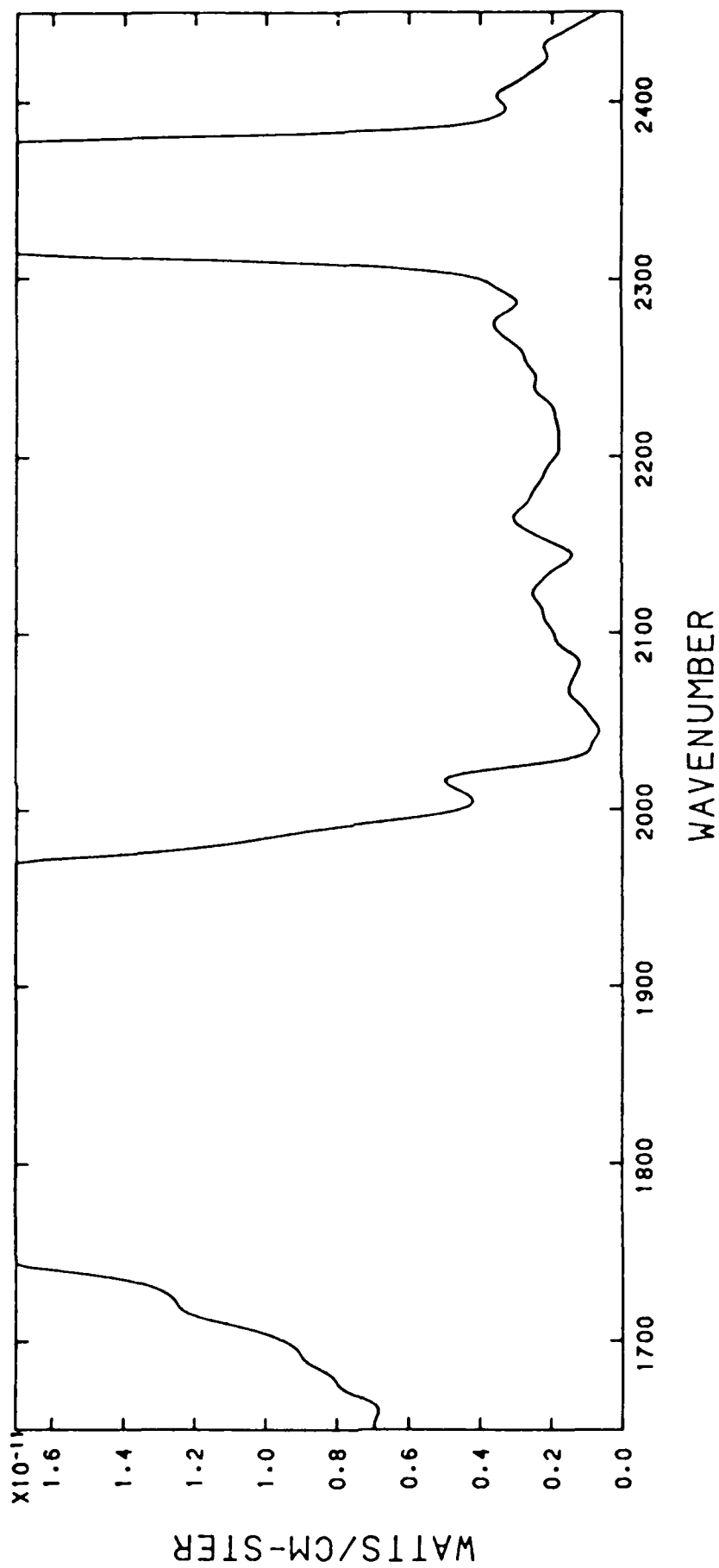
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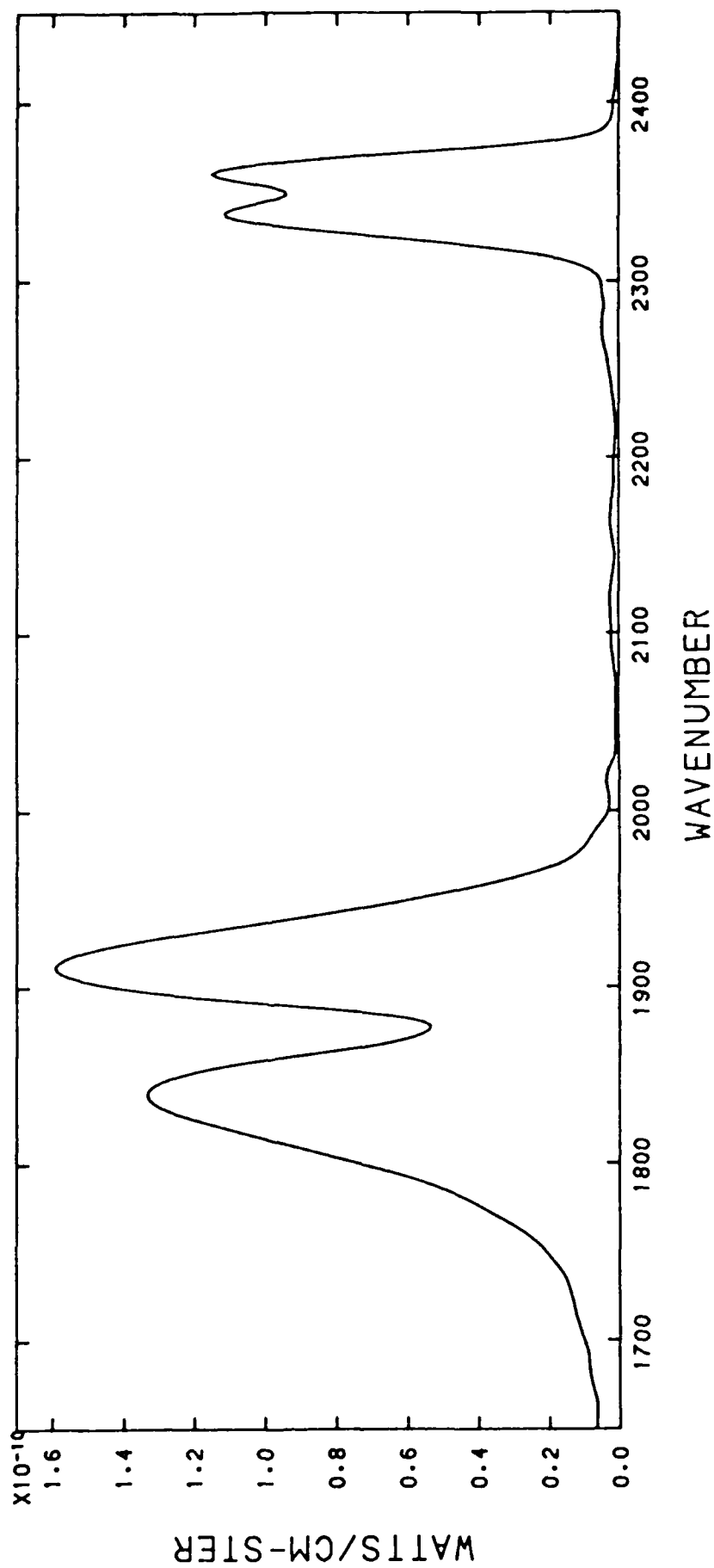


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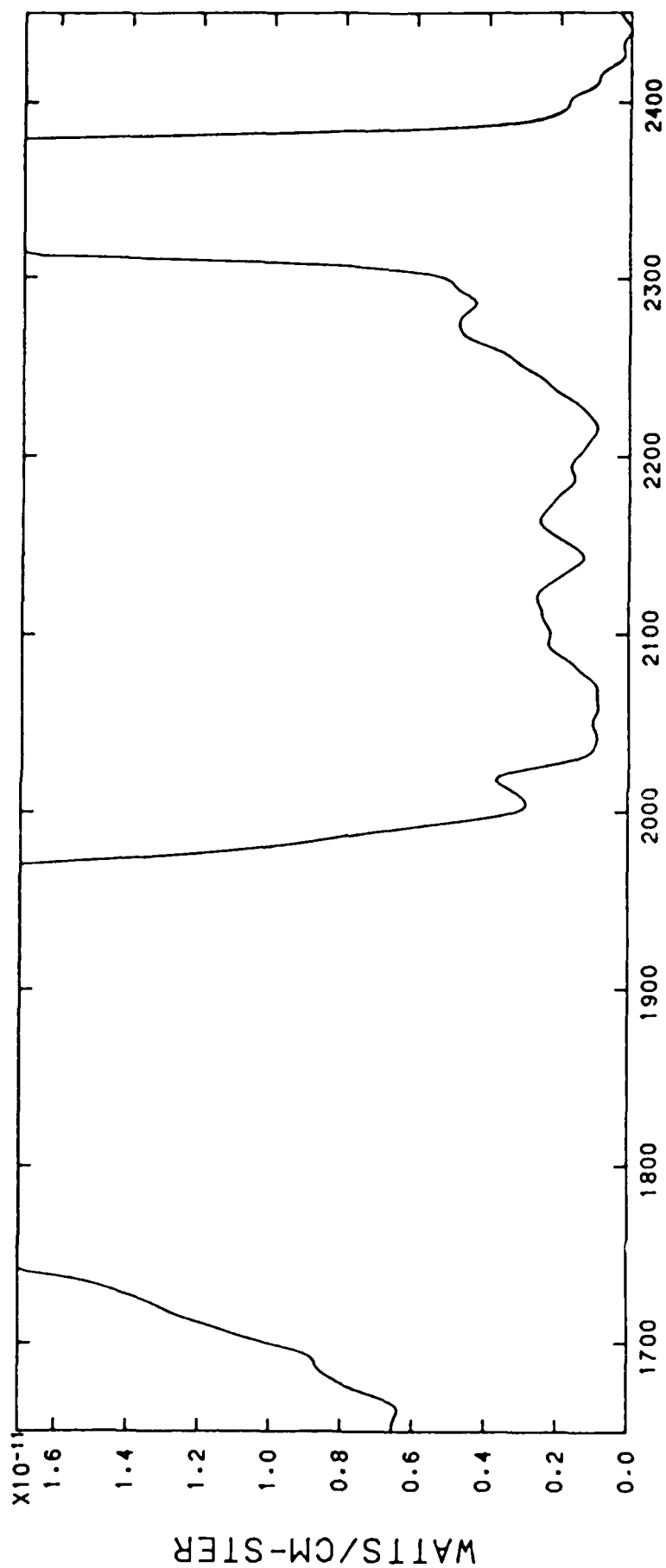


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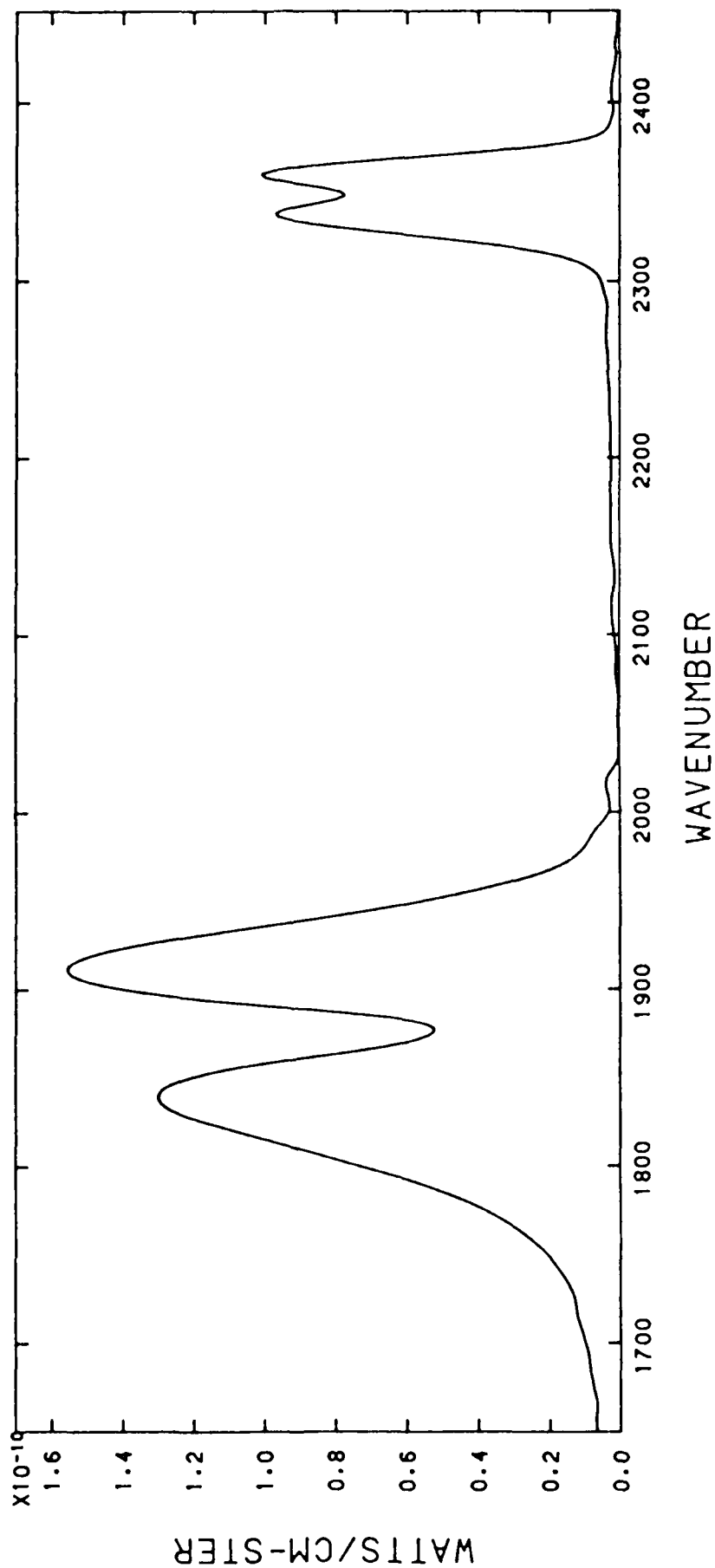
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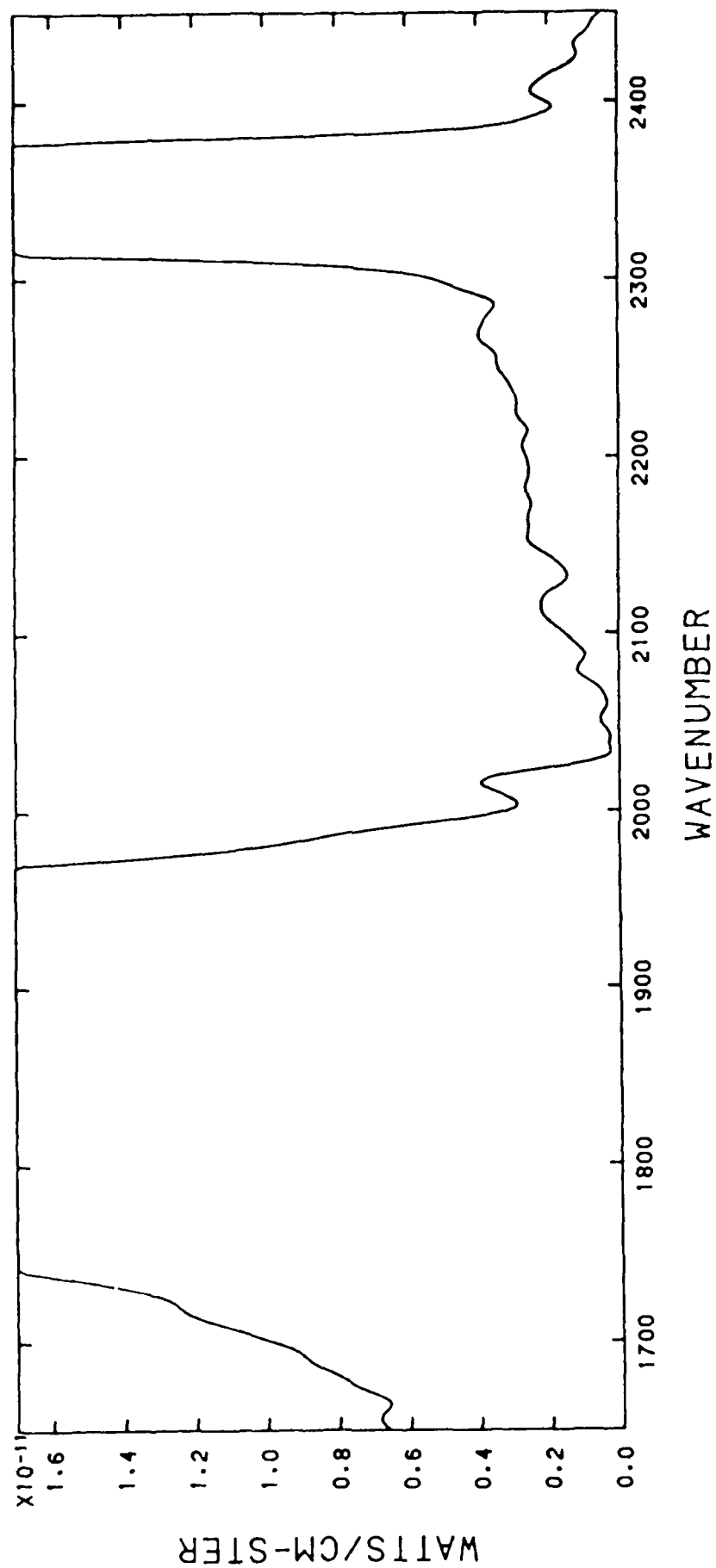
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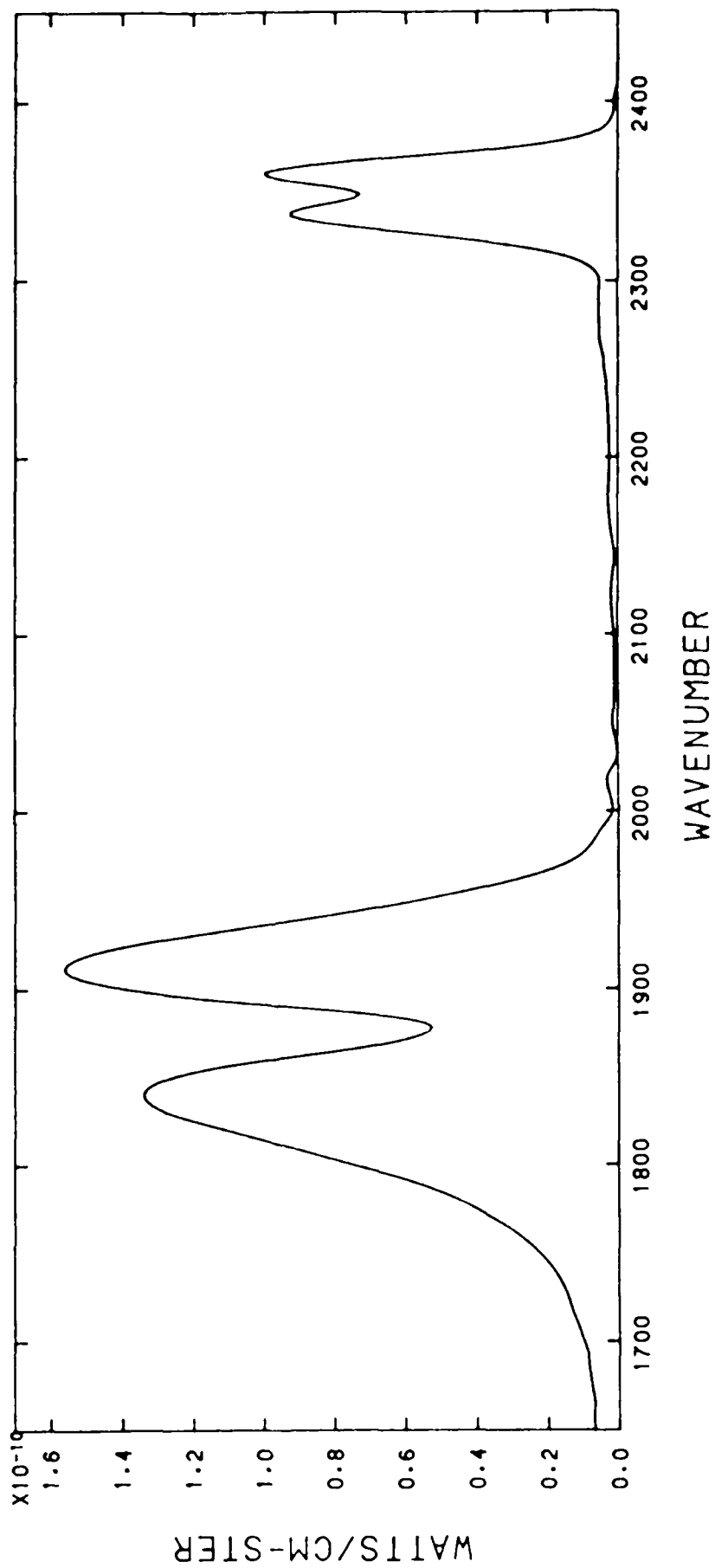


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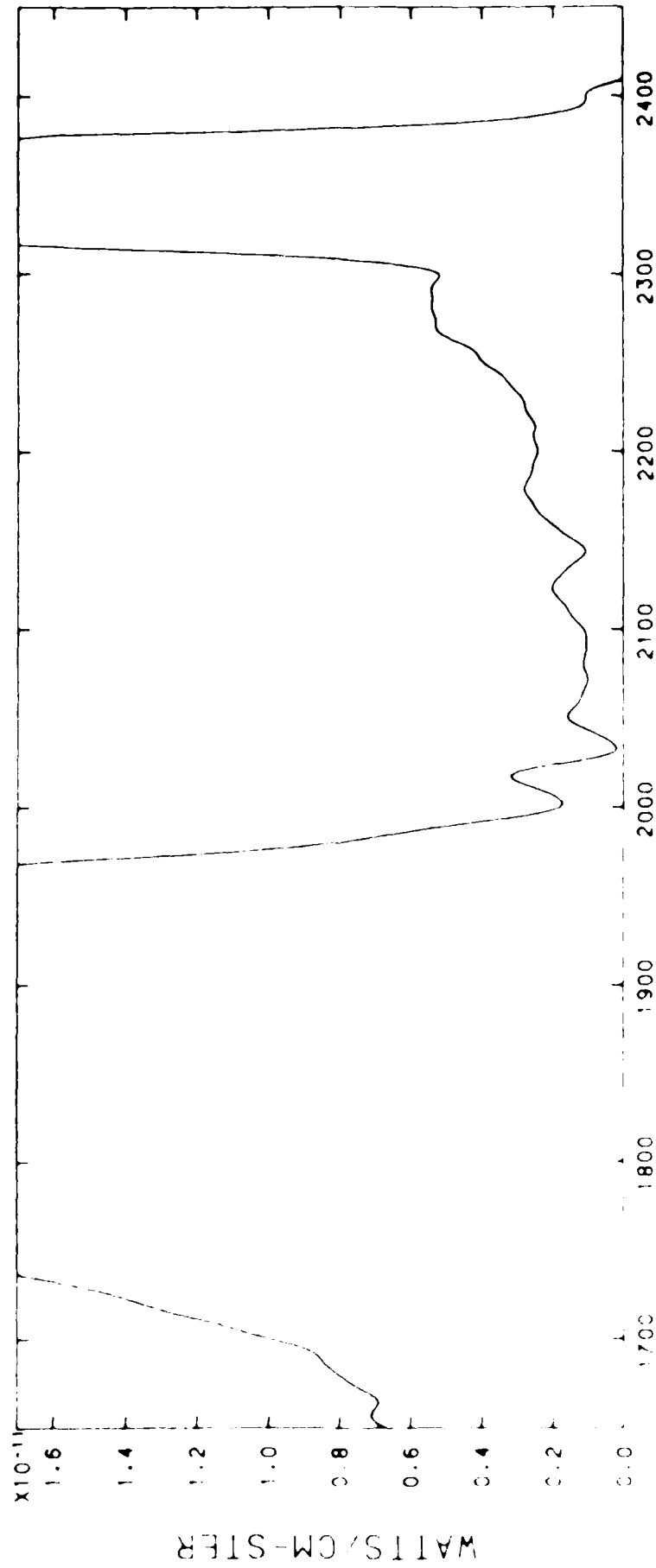
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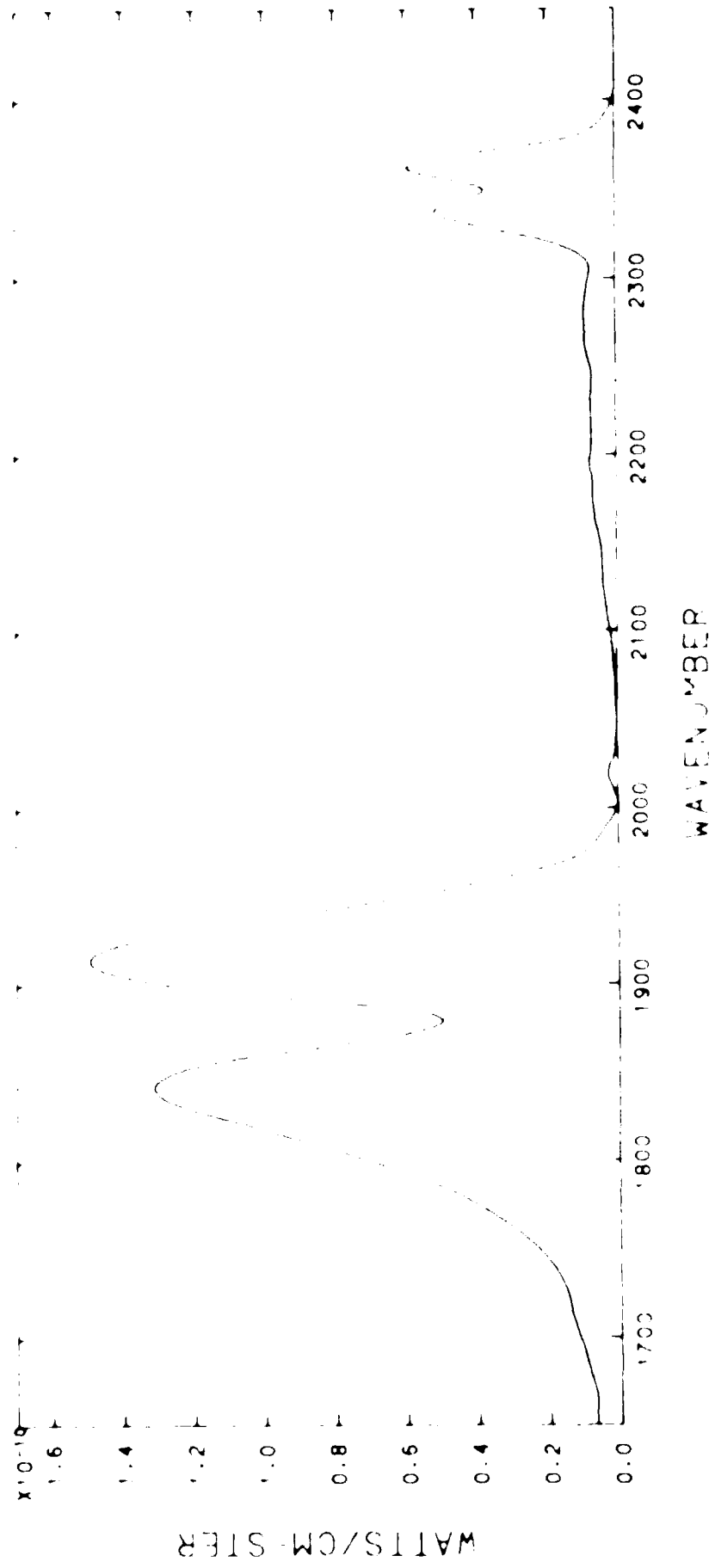


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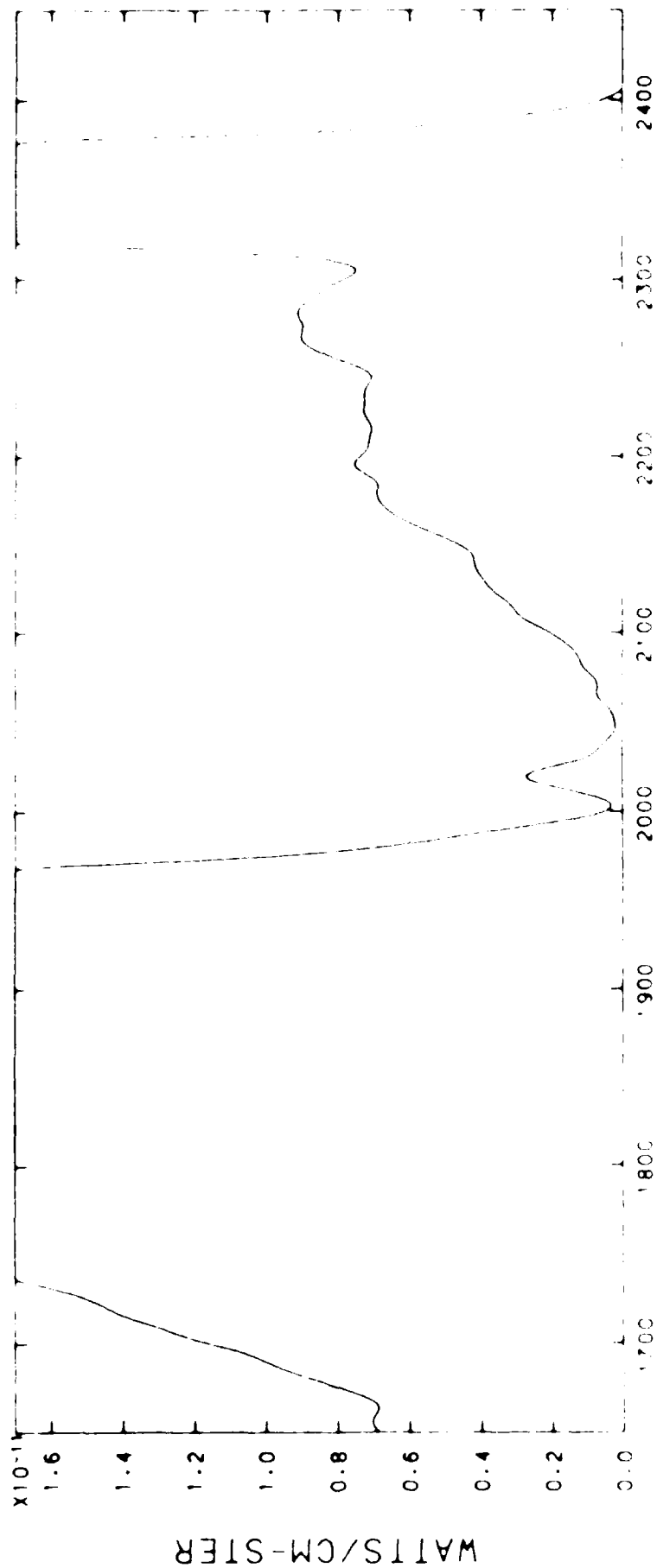
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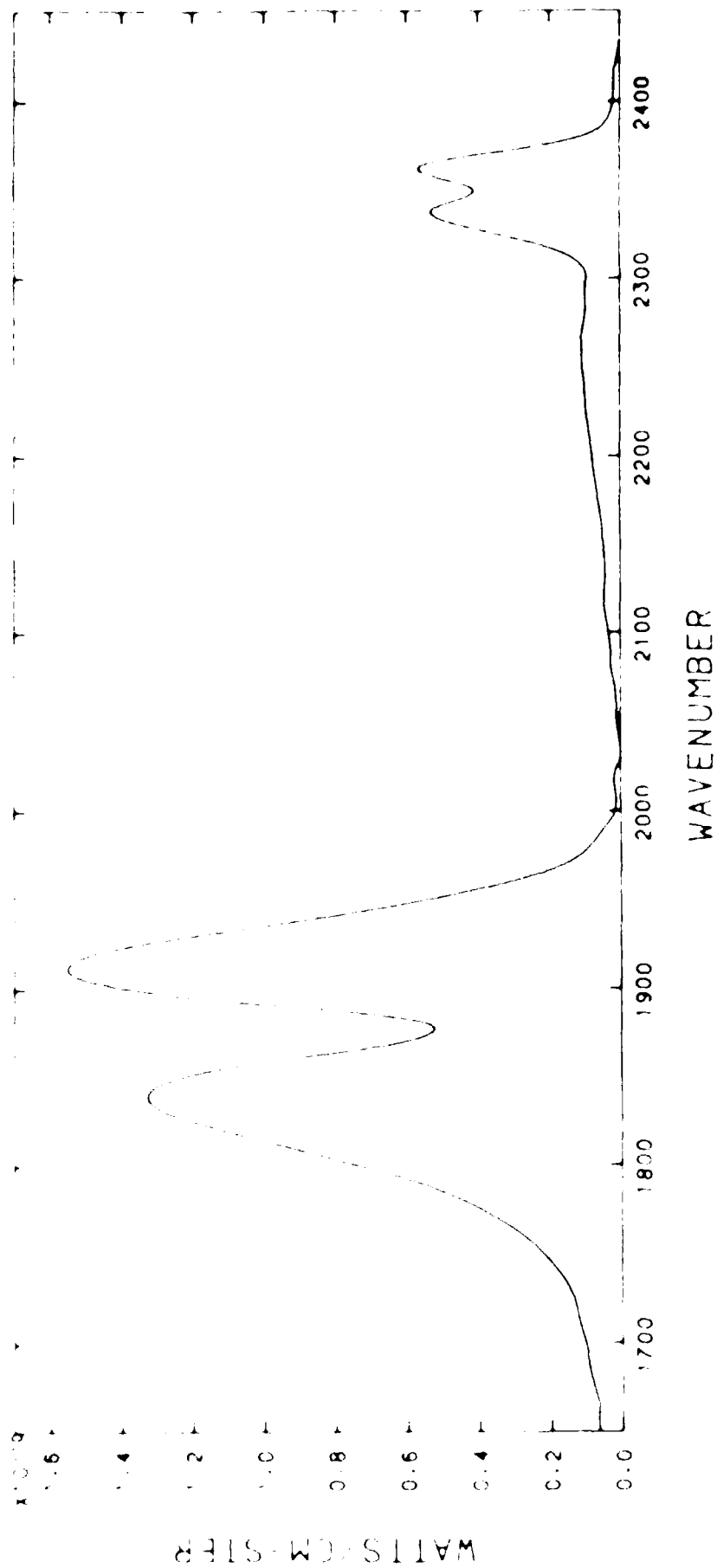


FILE NO. TIME 9: 7:59. '94. ALT 100.4-100.6 KM

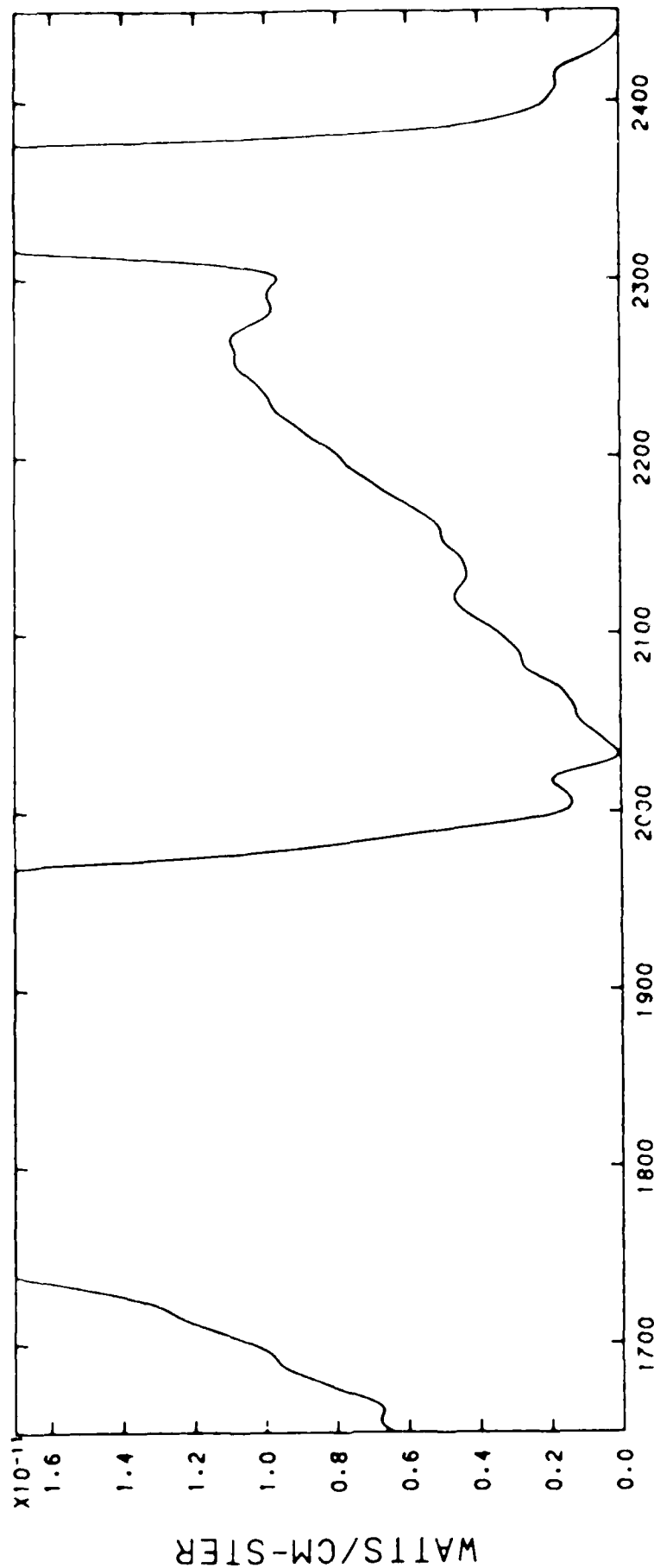


WAVELENGTH

FILE NO. TIME 9: 7:59. '94, WAVELENGTH 100.4 '00.6 WAVE



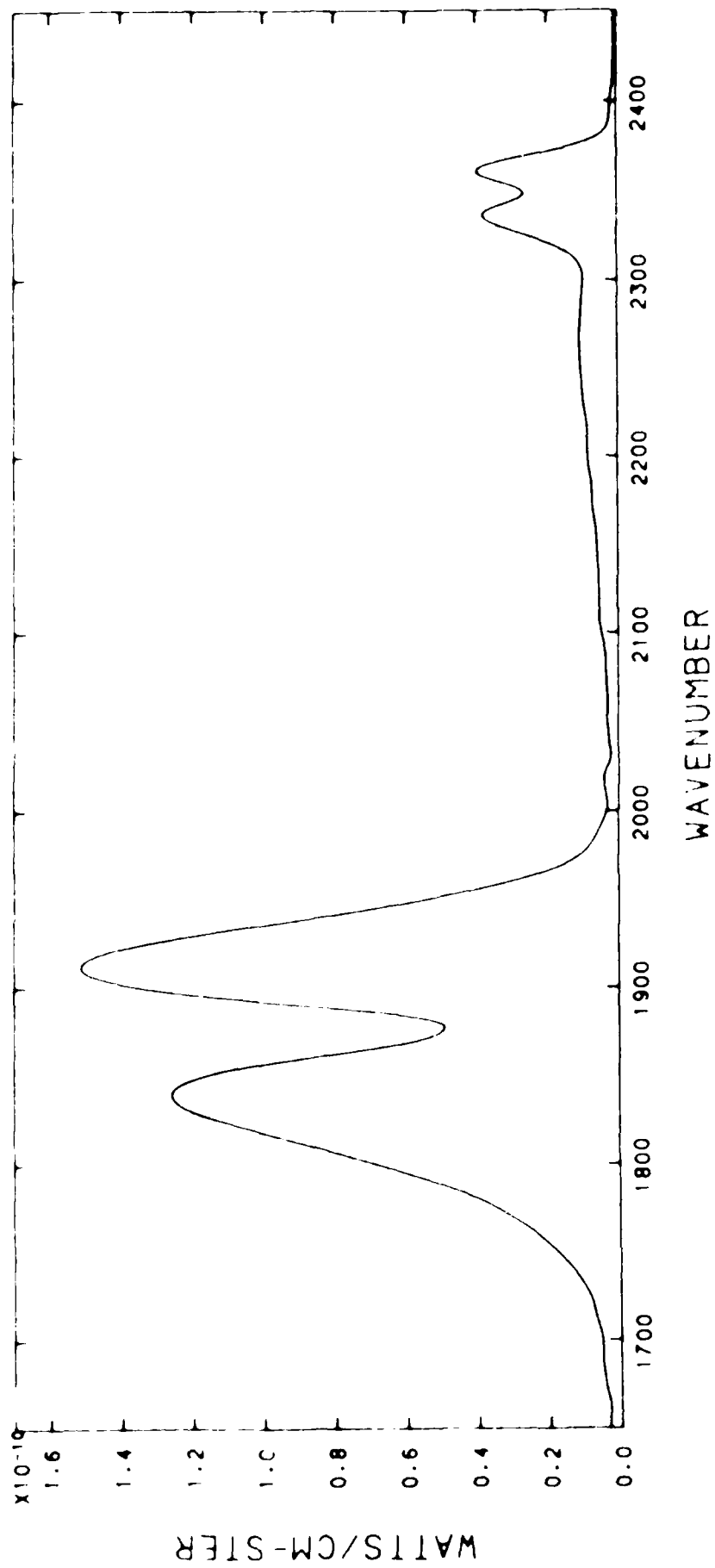
FILE 11, TIME 9: 7:59.692, ALT 100.8-101.1 KM



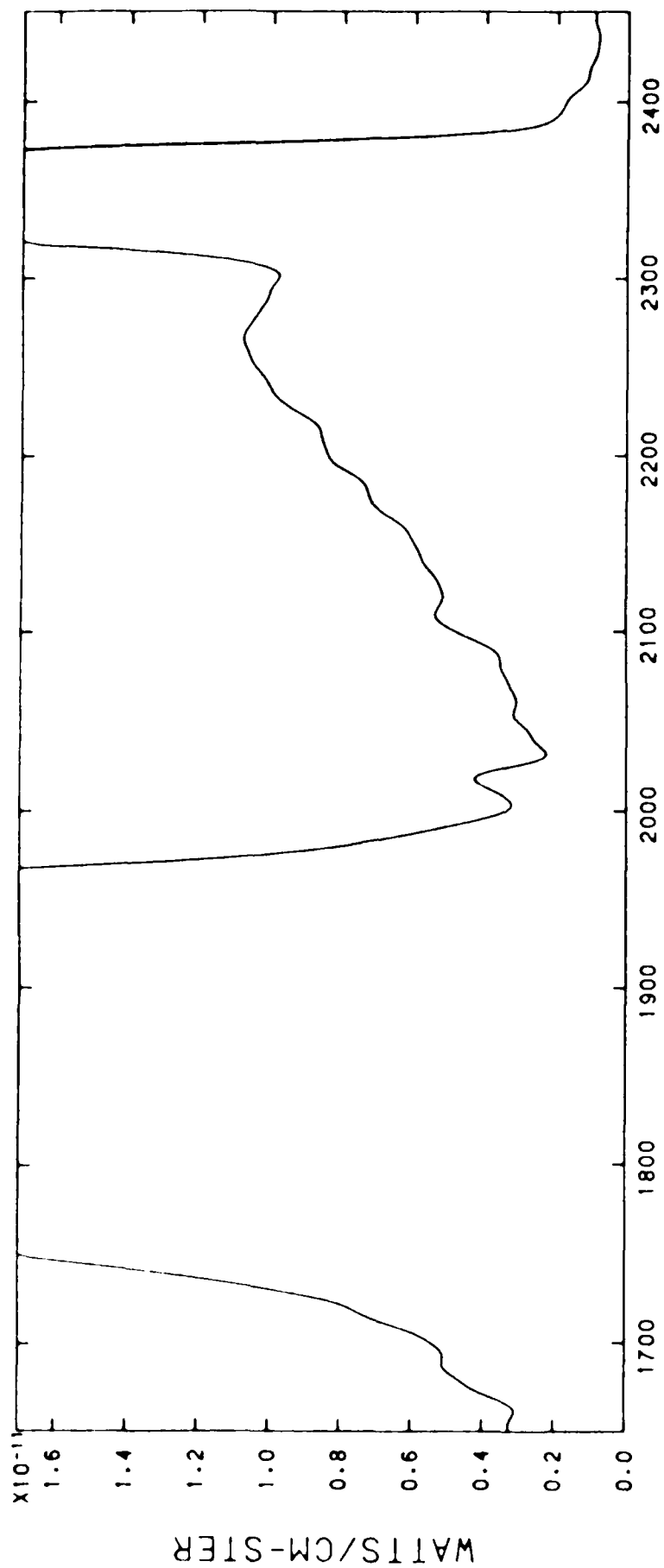
WAVELENGTH

FILE 11, TIME 9: 7:59.692, ALT 100.8-101.1 KM

30-NOV-83 09:16

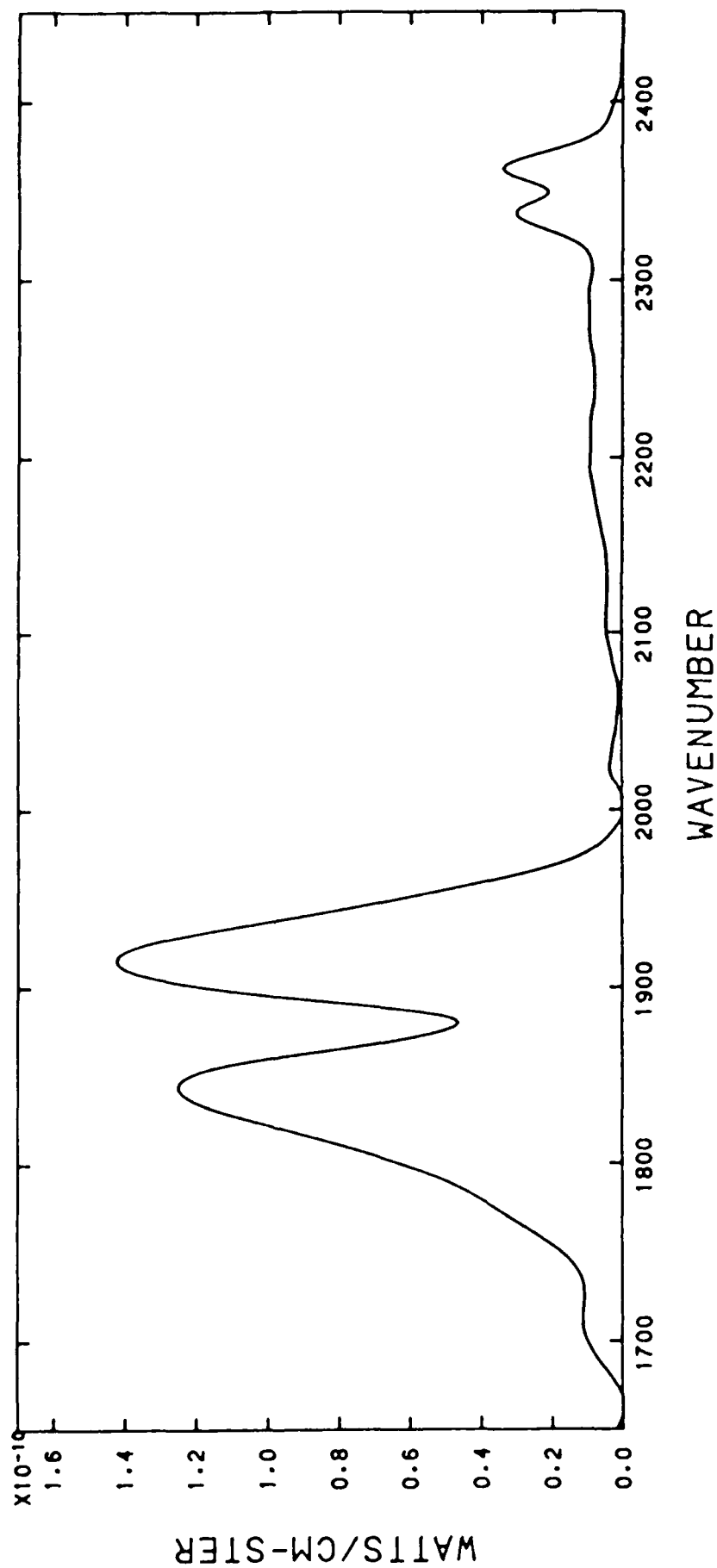


FILE 12. TIME 9: 8: 2.454. ALT 103.1-103.4 KM

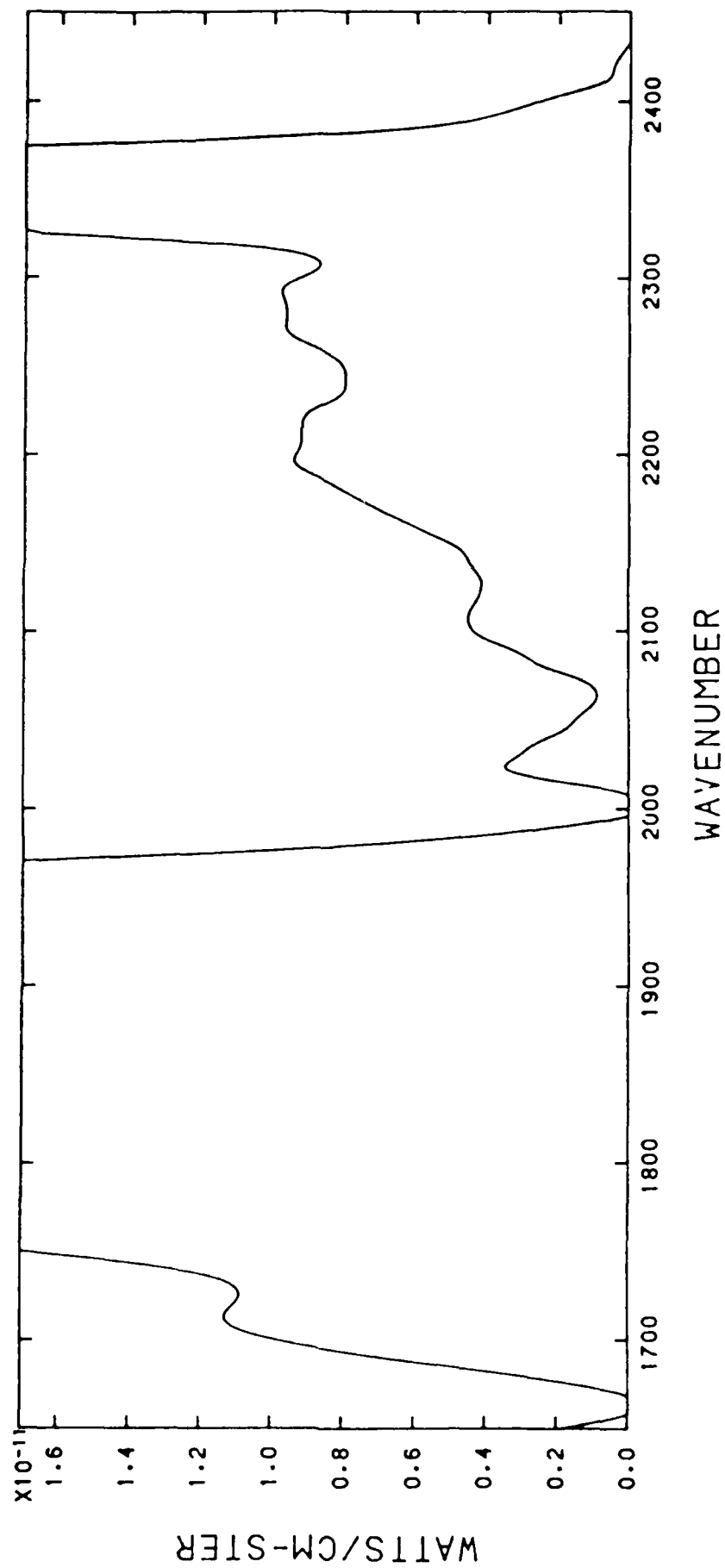


WAVENUMBER

FILE 12, TIME 9: 8: 2.454, ALT 103.1-103.4 KM

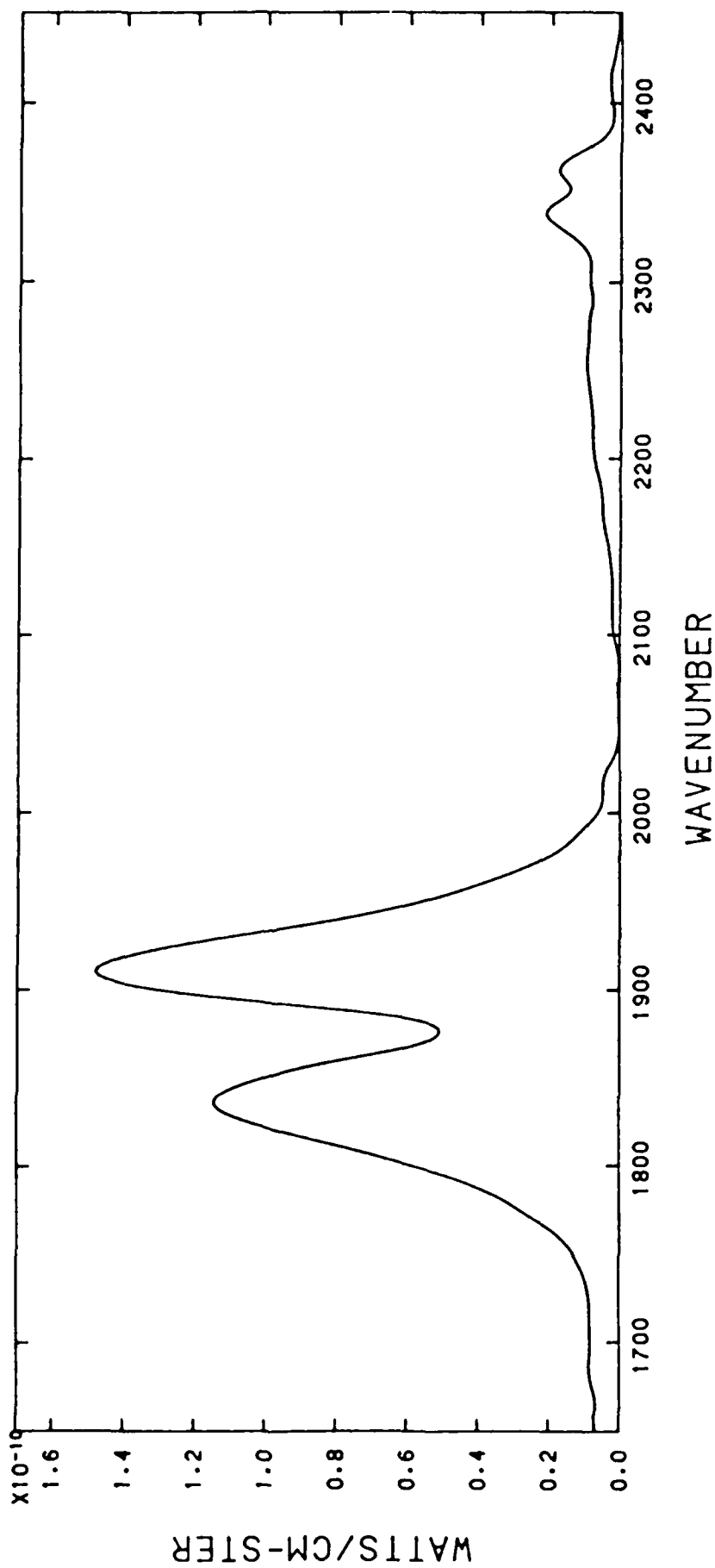


FILE 13, TIME 9: 8: 2.952, ALT 103.5-103.8 KM



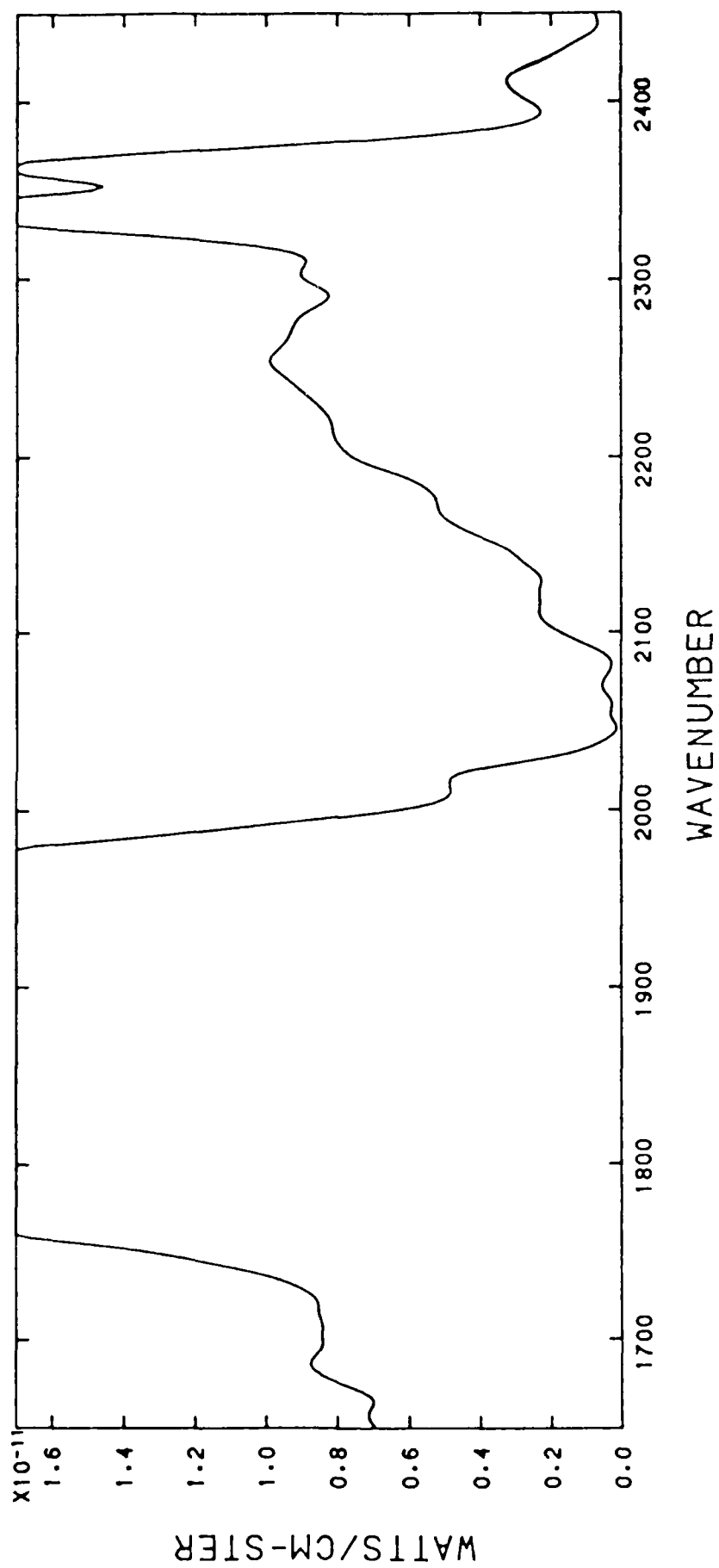
FILE 13, TIME 9: 8: 2.952, ALT 103.5-103.8 KM





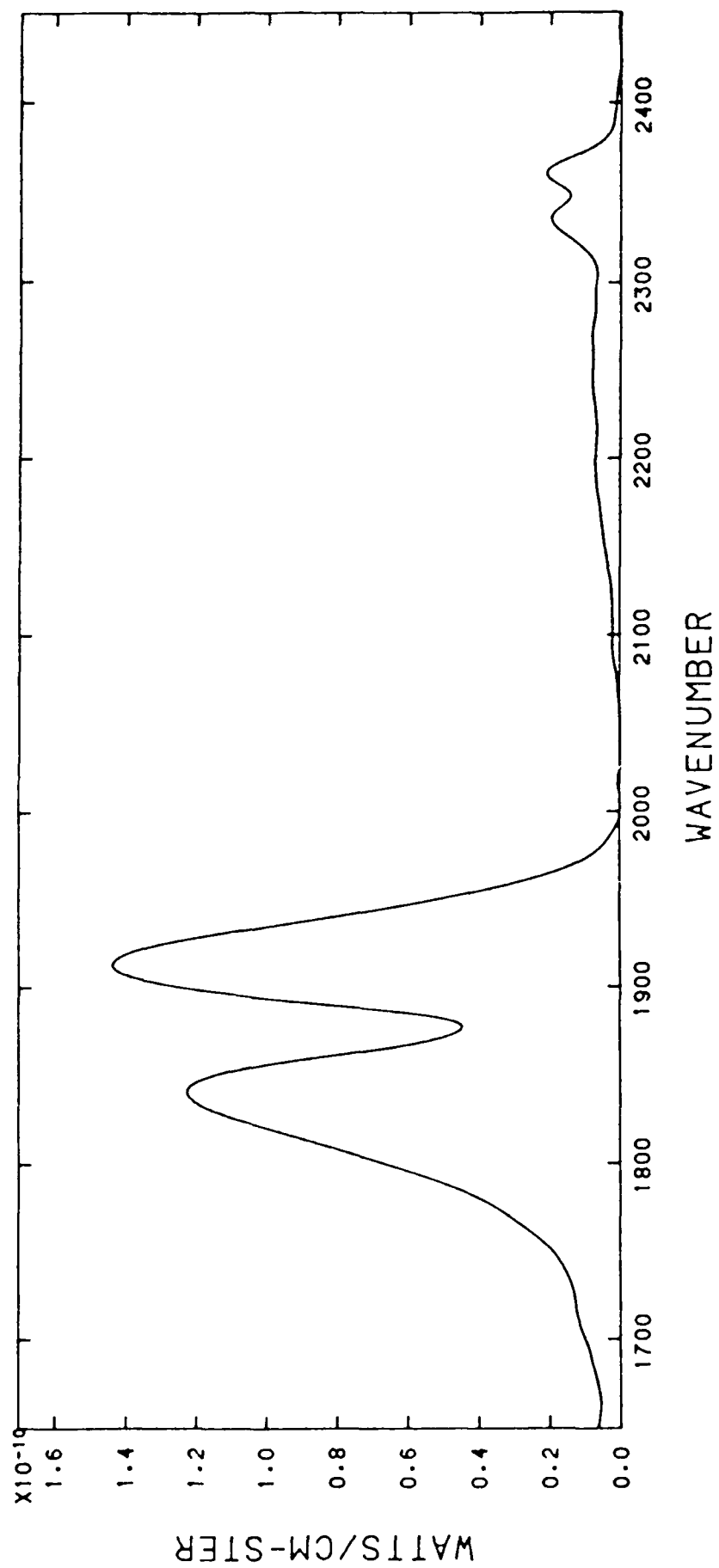
FILE 14, TIME 9: 8: 5.712, ALT 105.7-106.0 KM

30-807-83 08:17

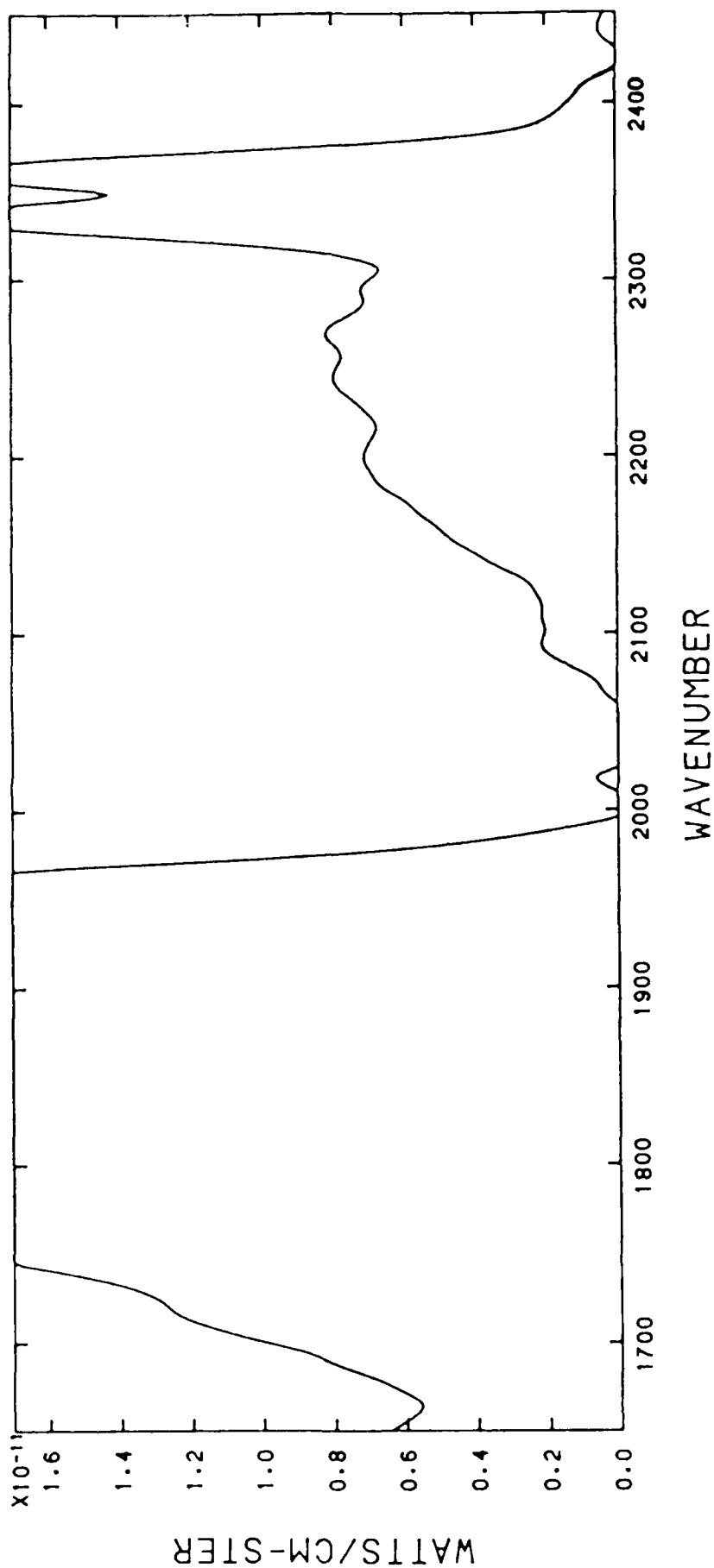


FILE 14, TIME 9: 8: 5.712, ALT 105.7-106.0 KM

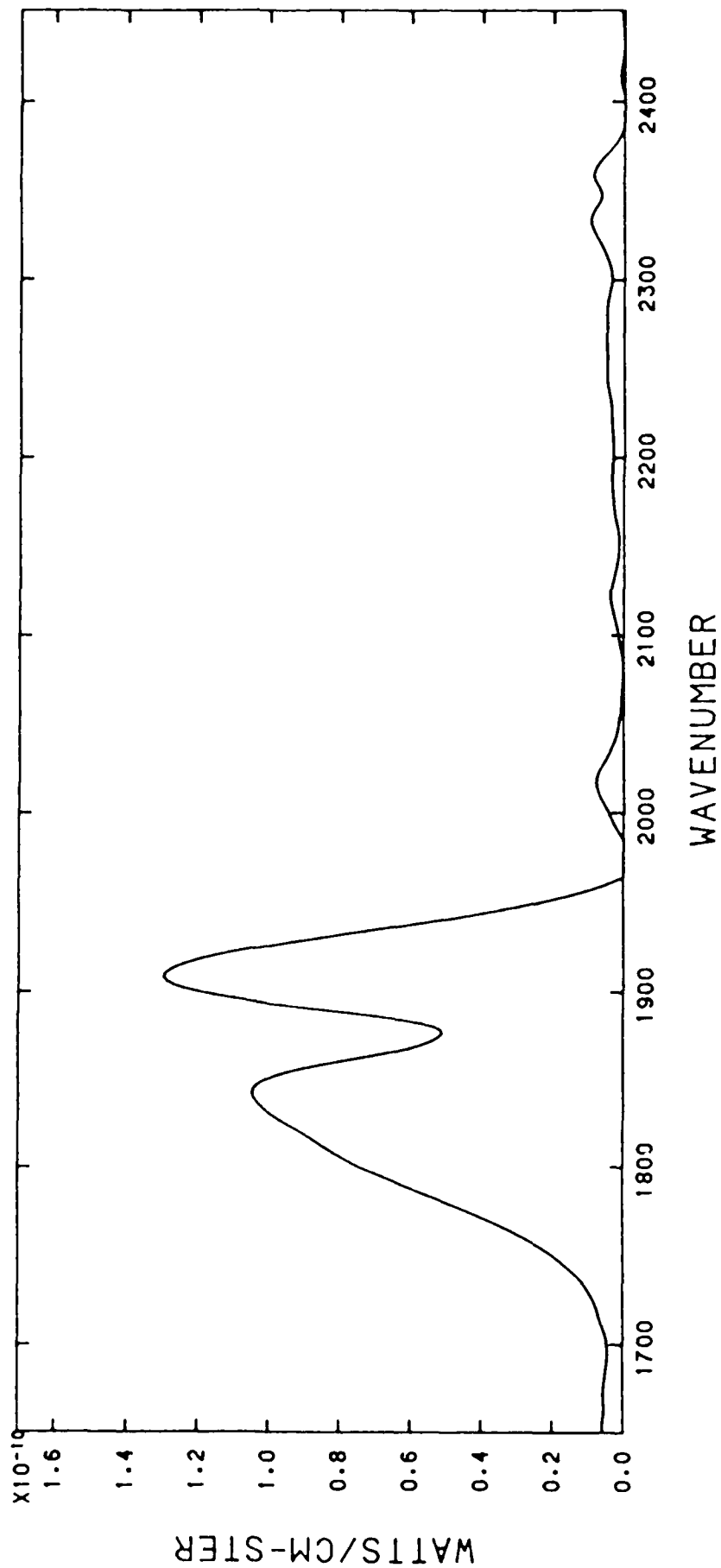
30-NOV-83 09:17



FILE 15, TIME 9: 8: 6.212, ALT 106.1-106.4 KM

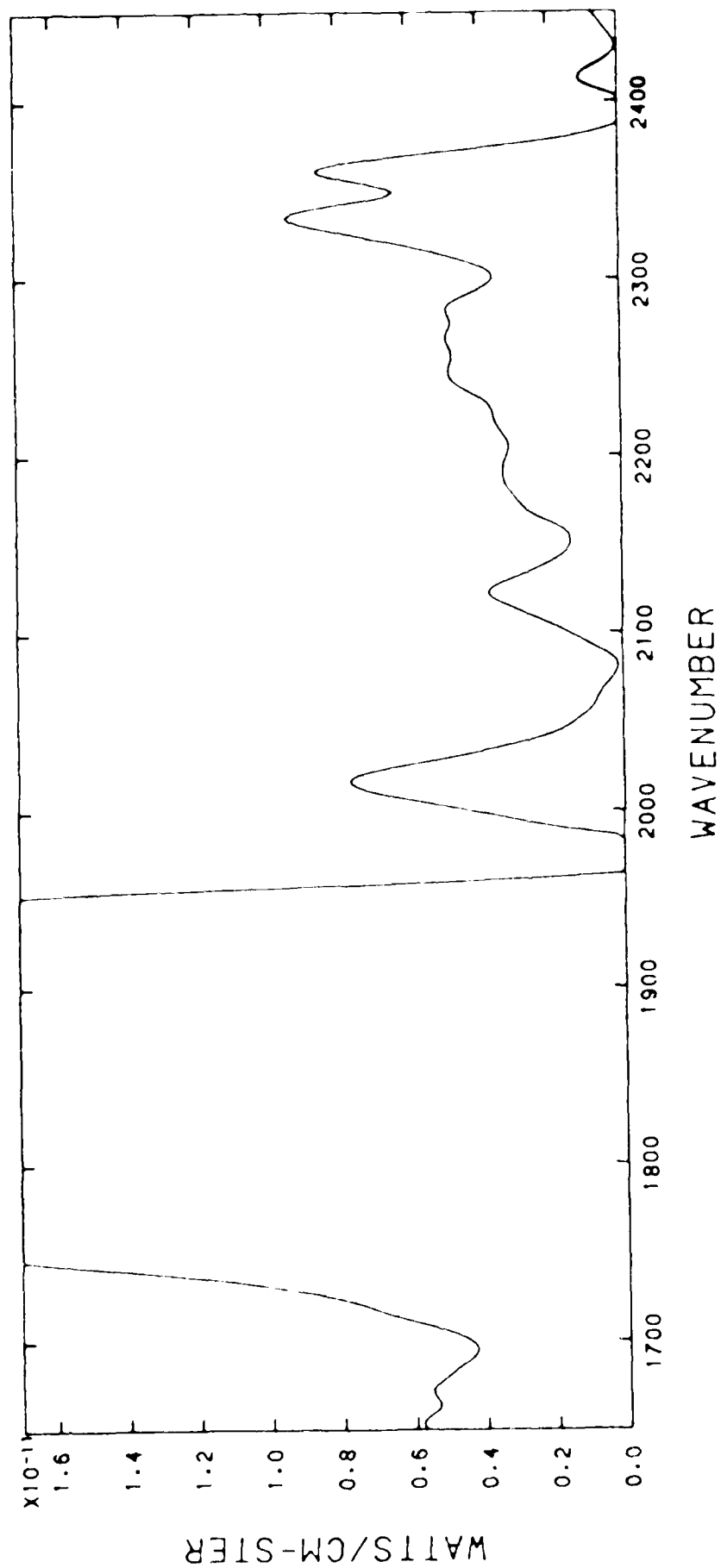


FILE 15, TIME 9: 8: 6.212, ALT 106.1-106.4 KM

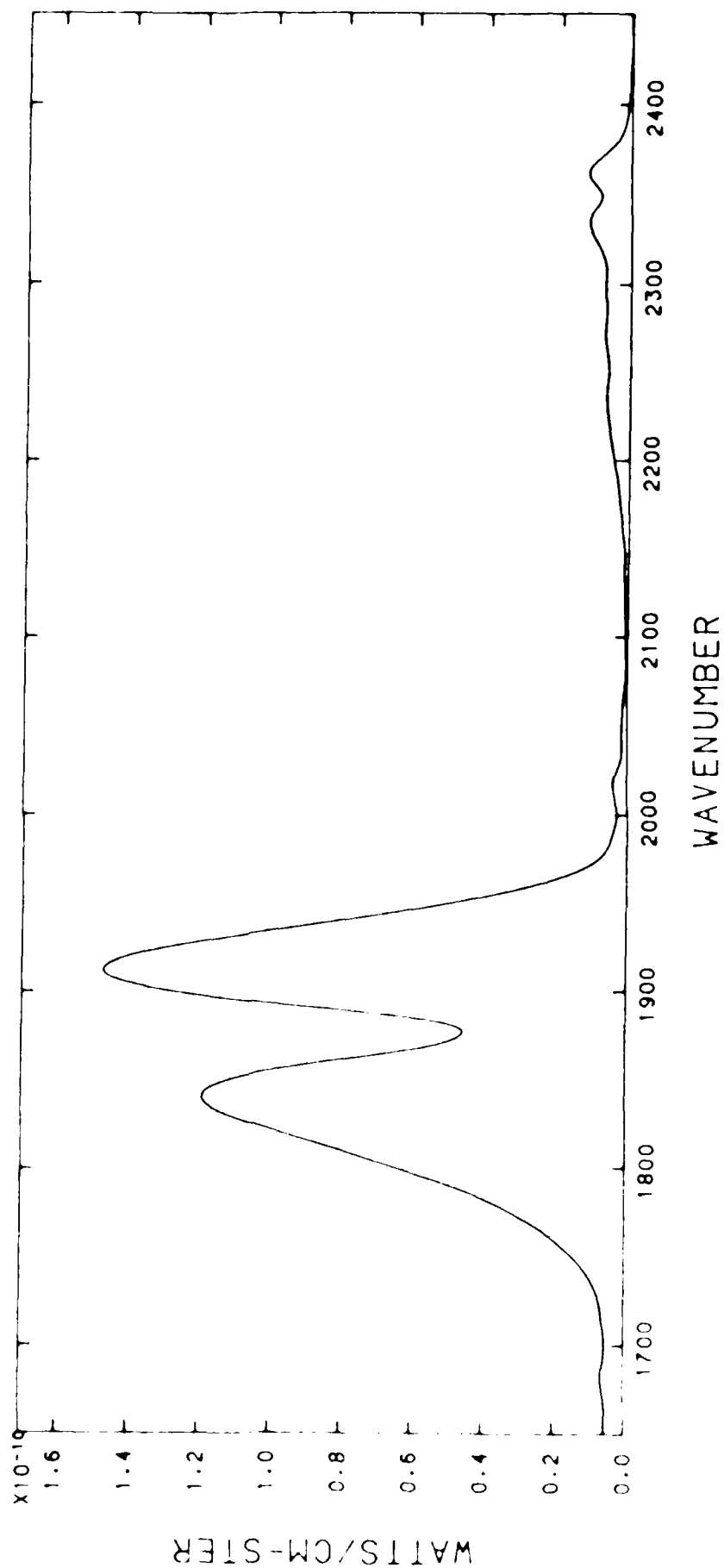


FILE 16, TIME 9: 8: 8.976, ALT 108.3-108.5 KM

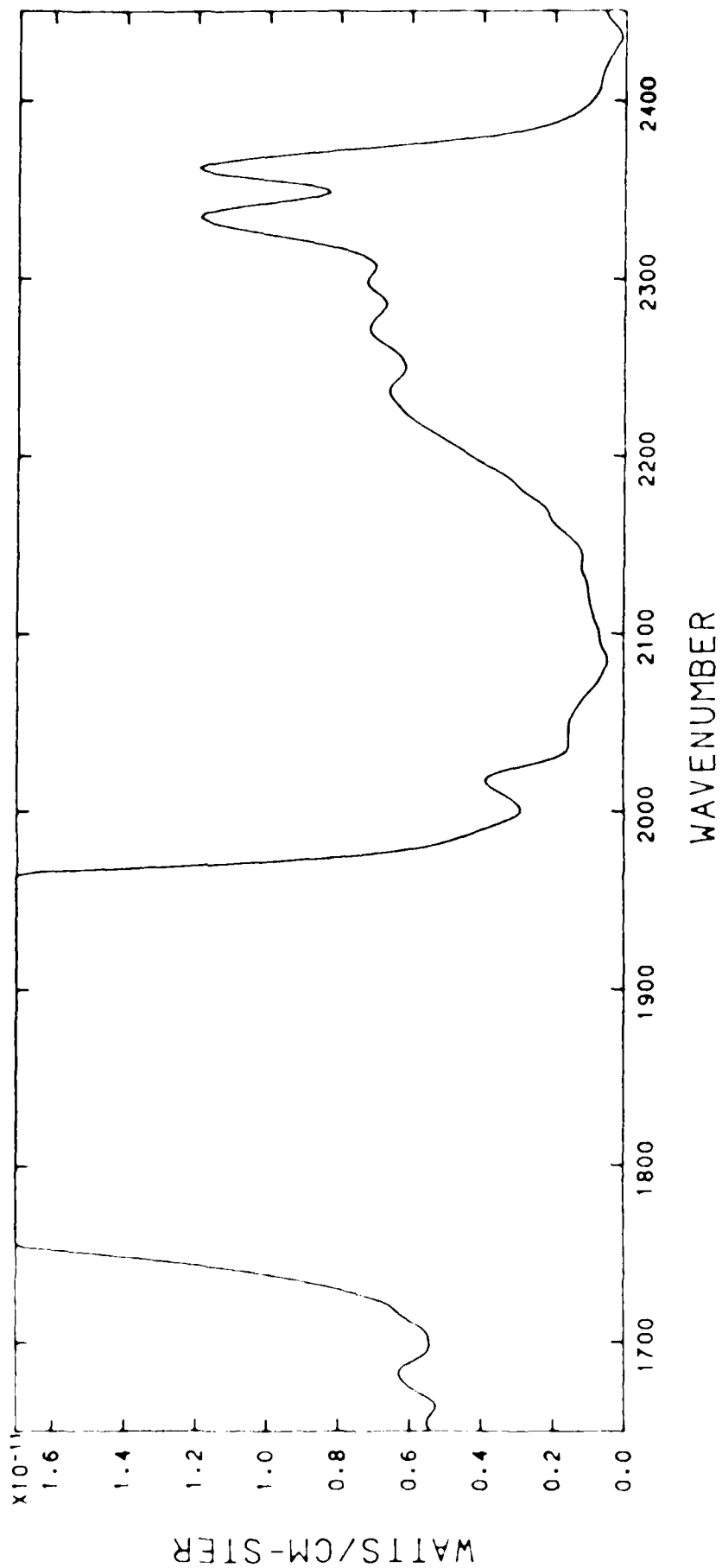
30-NOV-83 09:17



FILE 16, TIME 9: 8: 8.976, ALT 108.3-108.5 KM

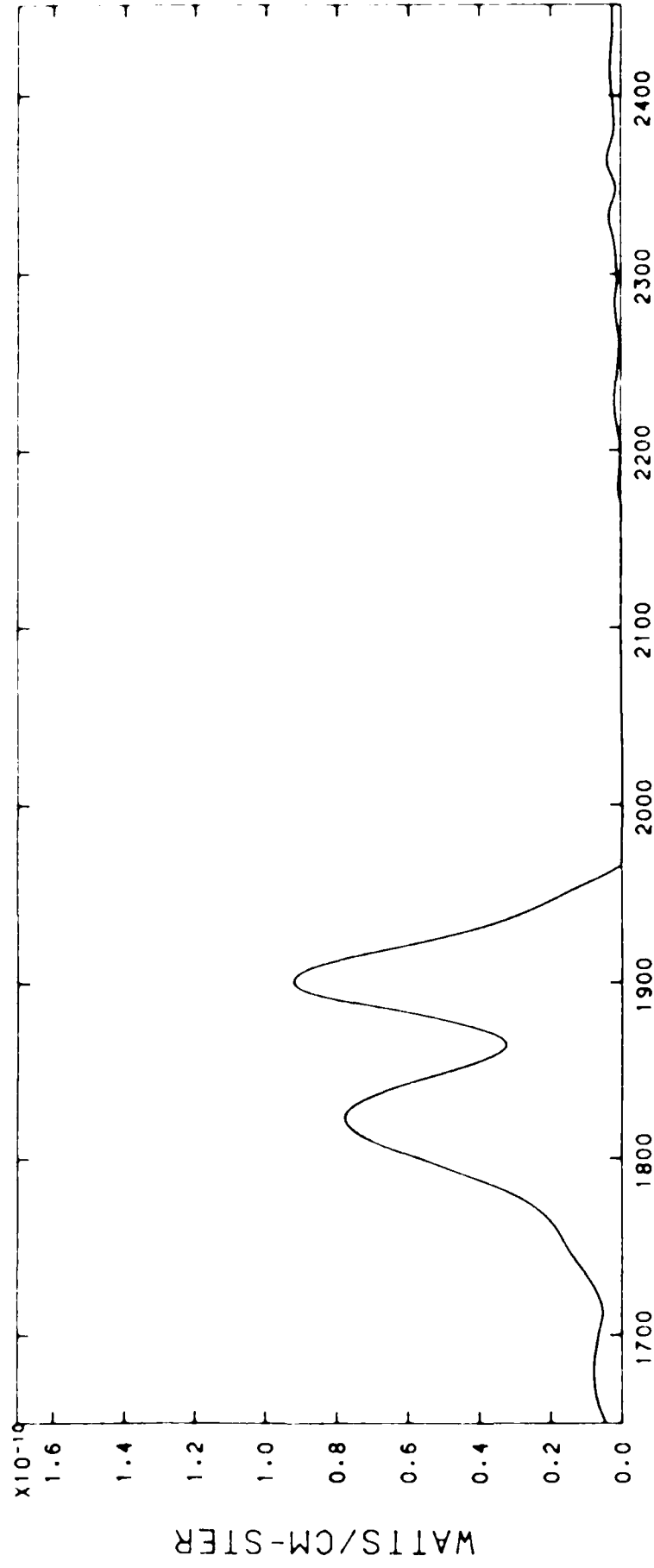


FILE 17, TIME 9: 8: 9.476, ALT 108.7-108.9 KM



FILE 17, TIME 9: 8: 9.476, ALT 108.7-108.9 KM

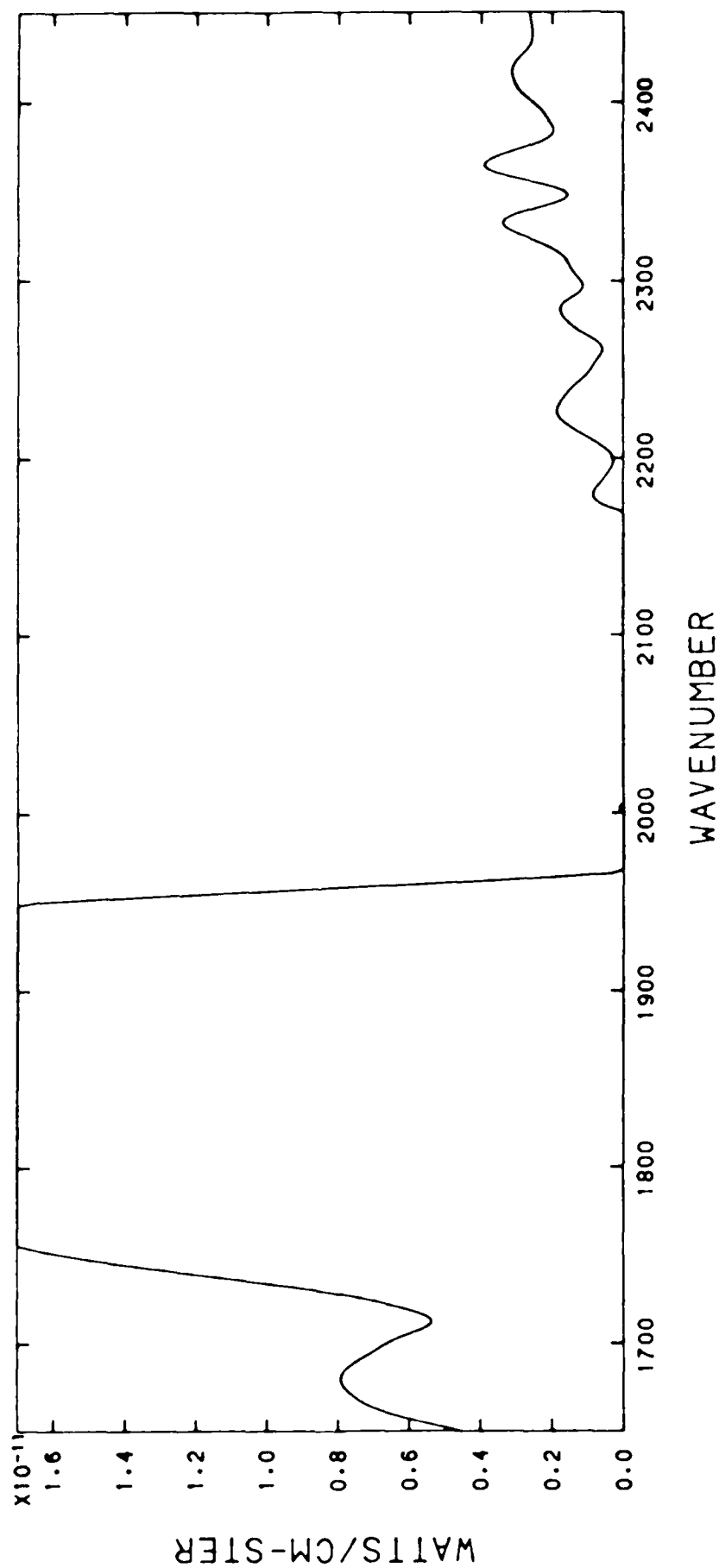




WAVENUMBER

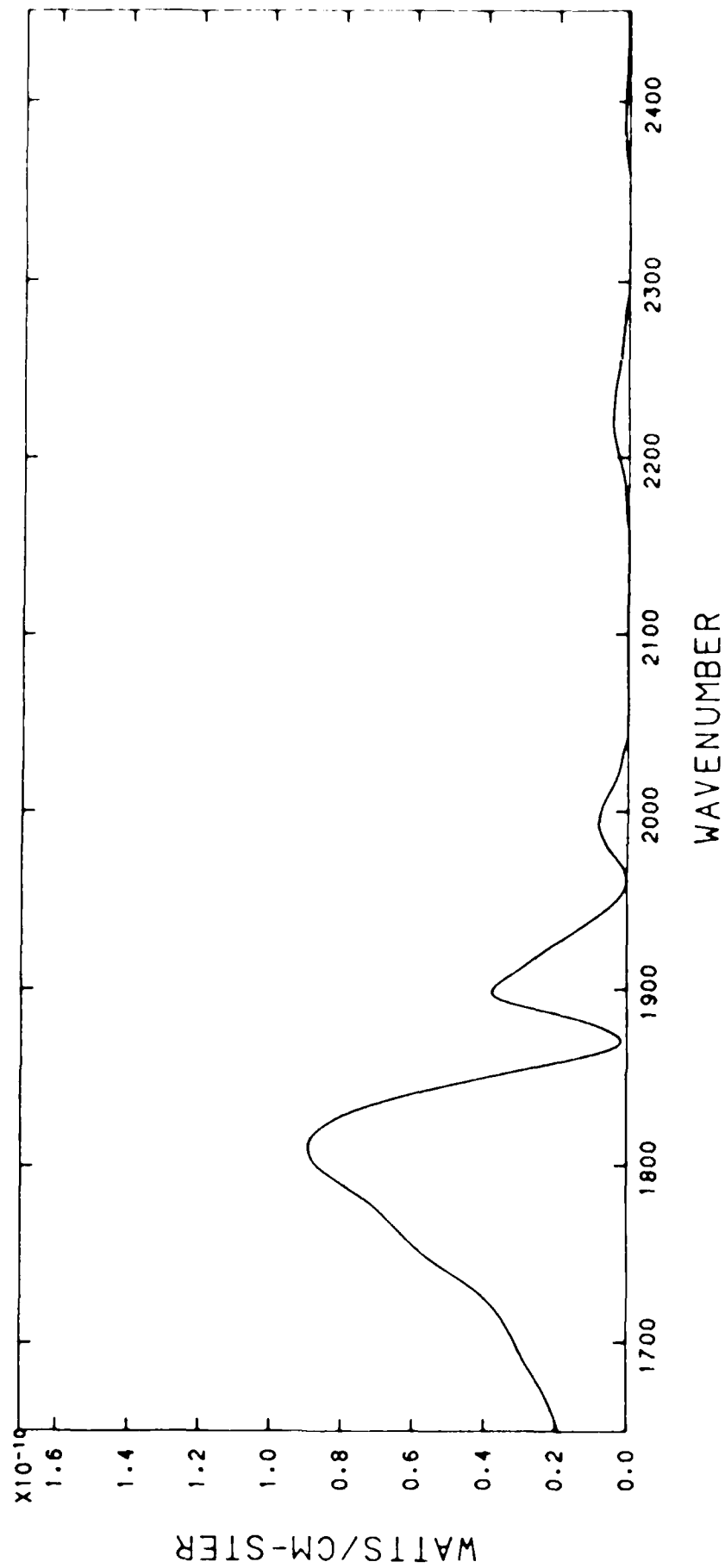
FILE 18, TIME 9: 8:12.242, ALT 110.7-111.0 KM

30-NOV-83 09:18



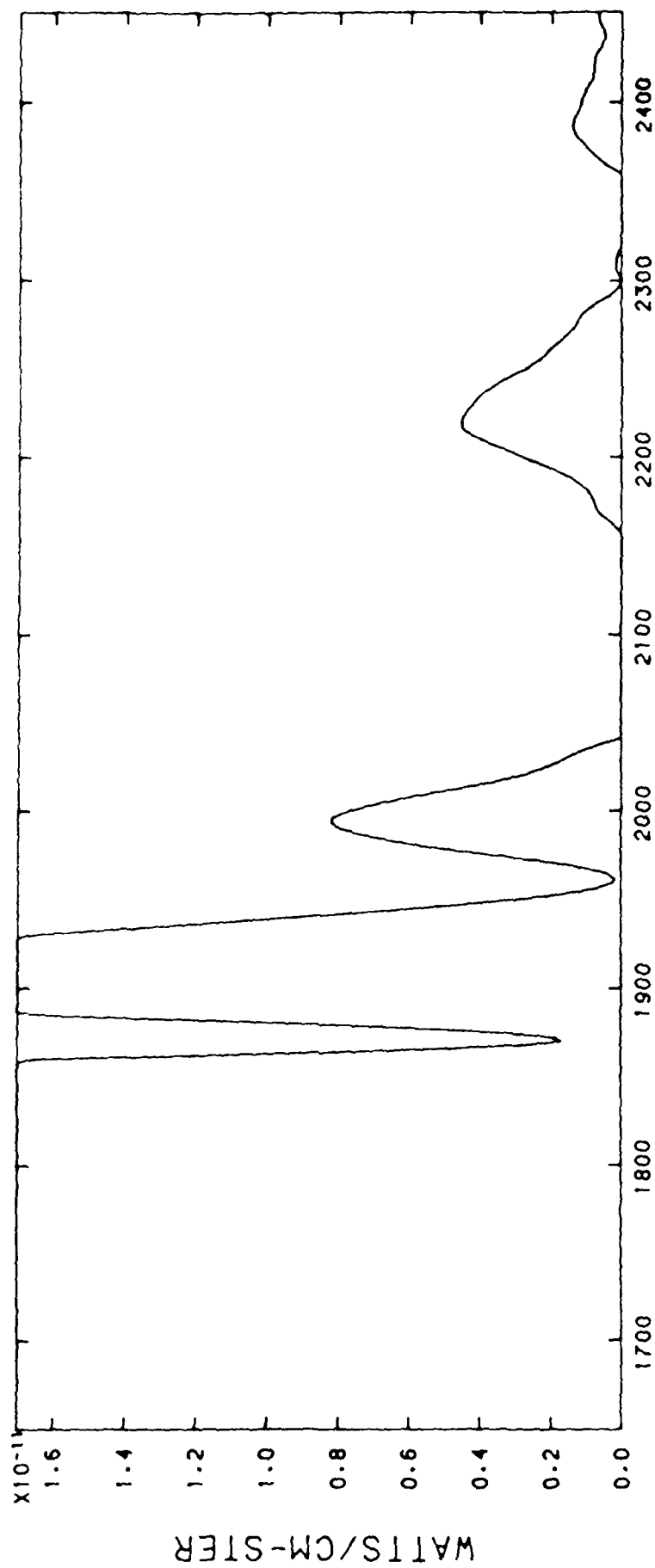
FILE 18, TIME 9: 8:12.242, ALT 110.7-111.0 KM

30-NOV-83 09:18



FILE 19, TIME 9: 8:12.736, ALT 111.1-111.3 KM

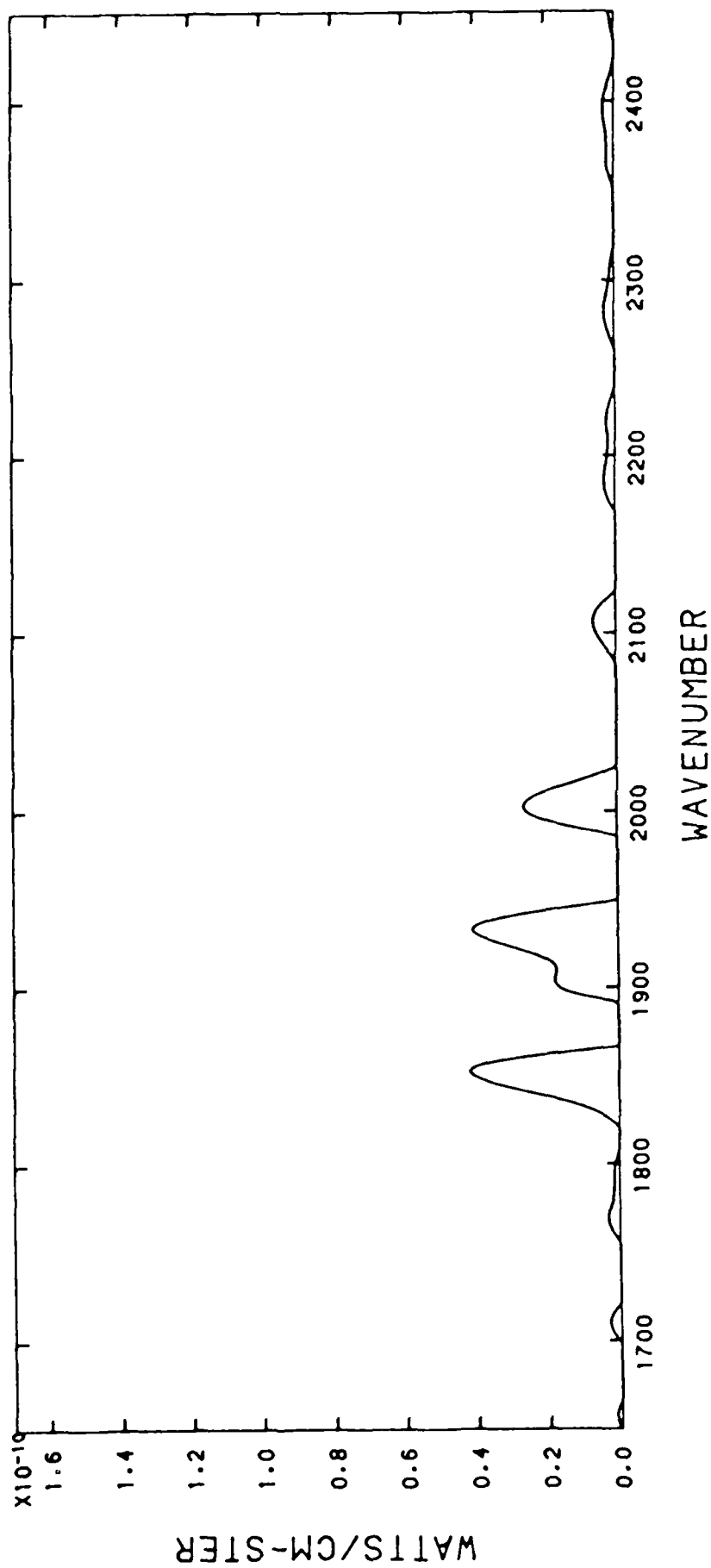
30-NOV-83 09:18



WAVENUMBER

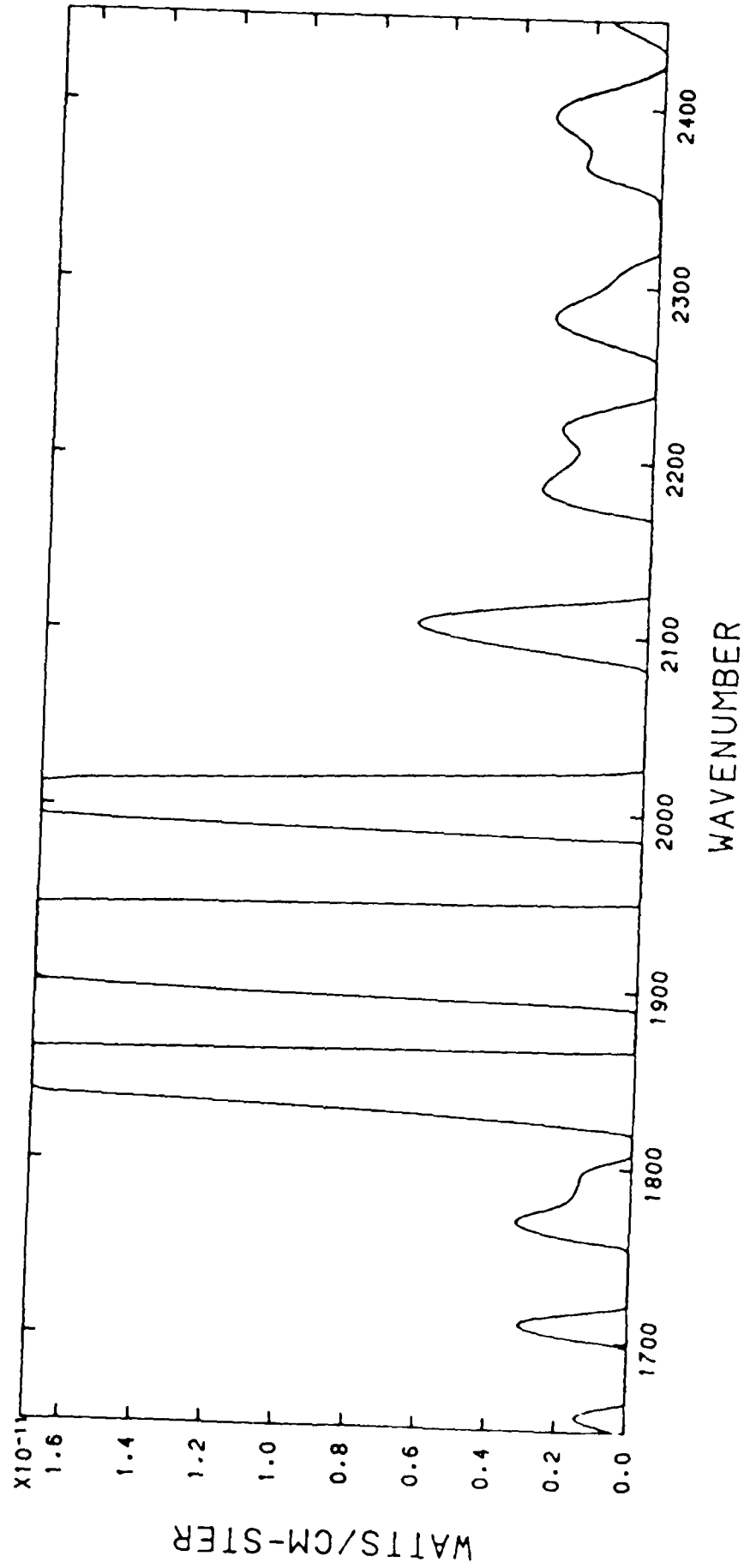
FILE 19. TIME 9: 8:12.736. ALT 111.1-1111.3 KM

30-NOV-83 09:18



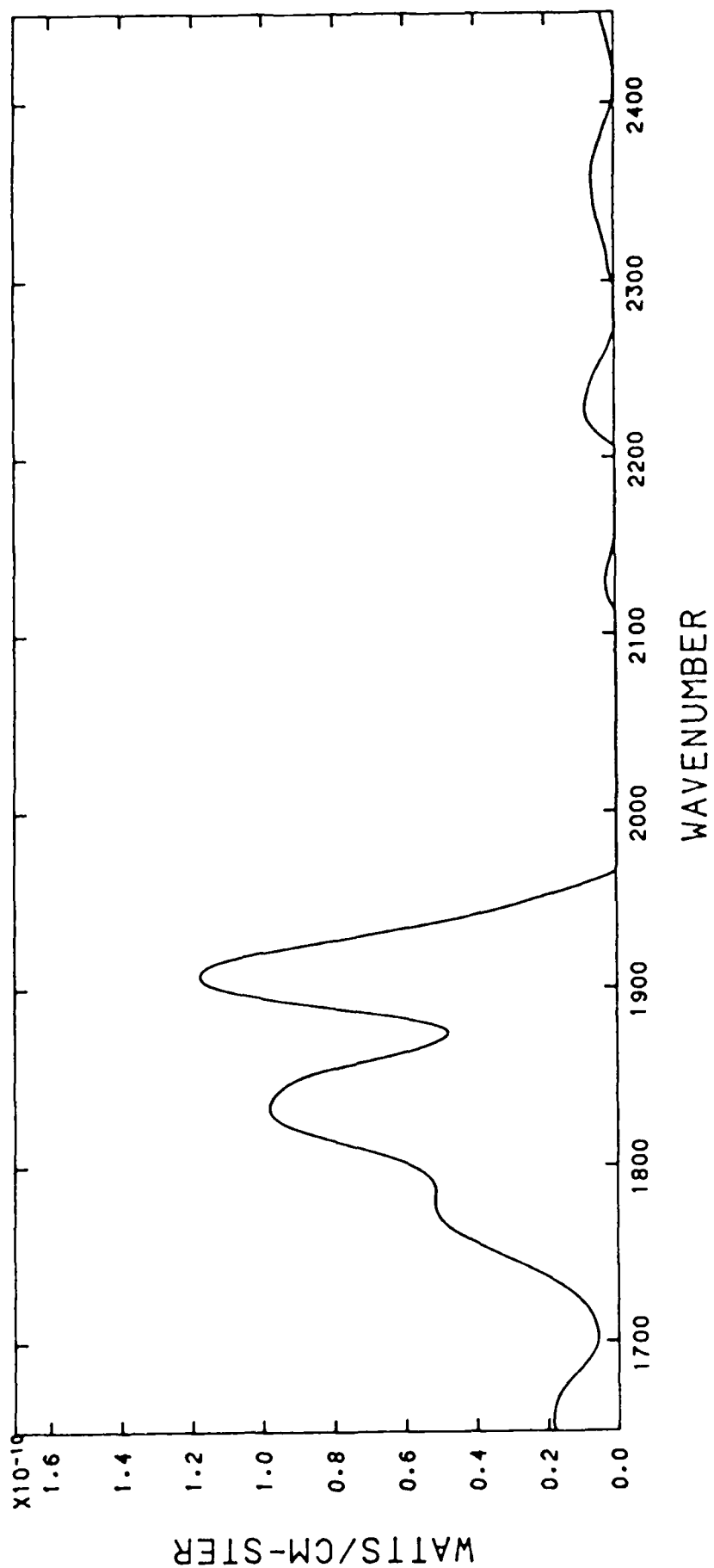
FILE 20, TIME 9: 8:15.526, ALT 113.1-113.3 KM

30-NOV-83 09:18

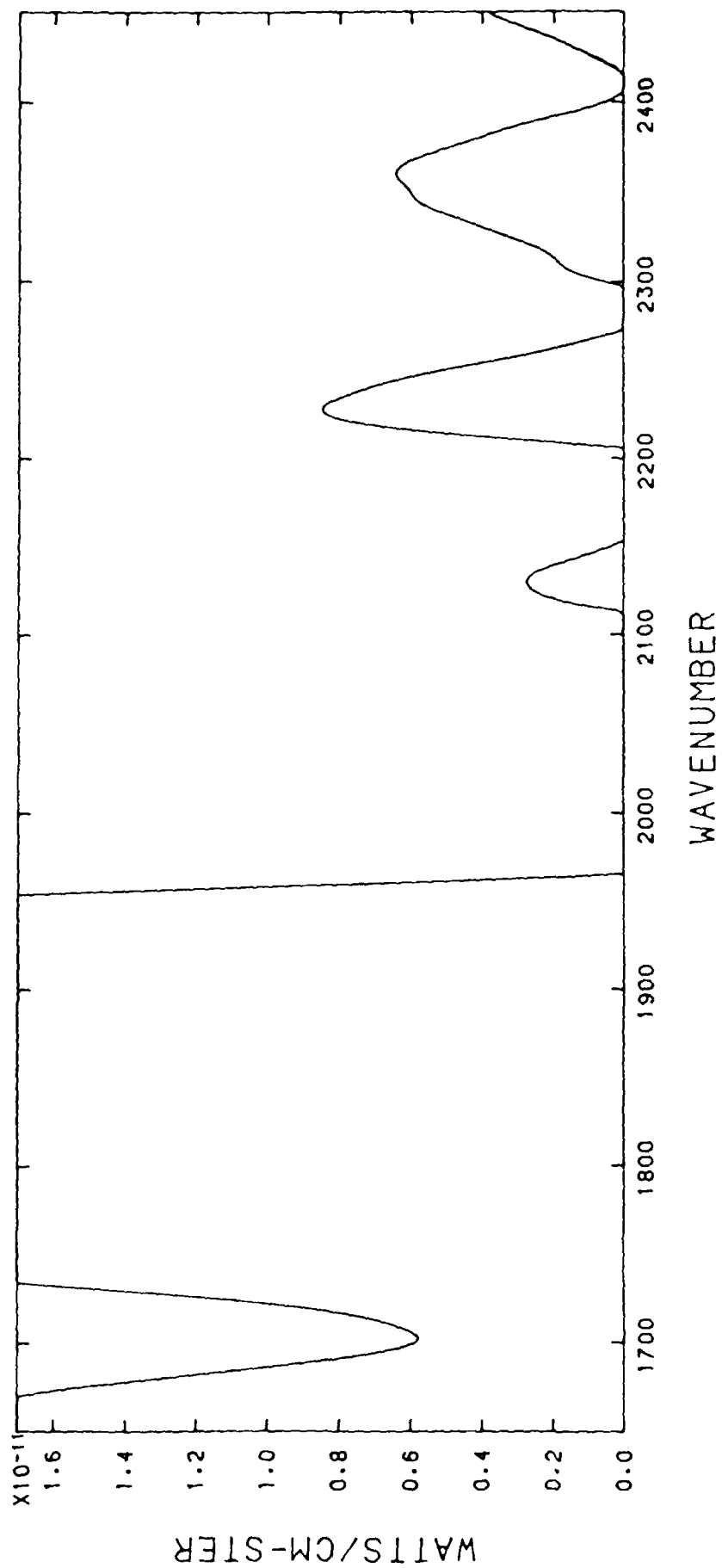


FILE 20, TIME 9: 8:15.526, ALT 113.1-113.3 KM

30-NOV-83 09:18

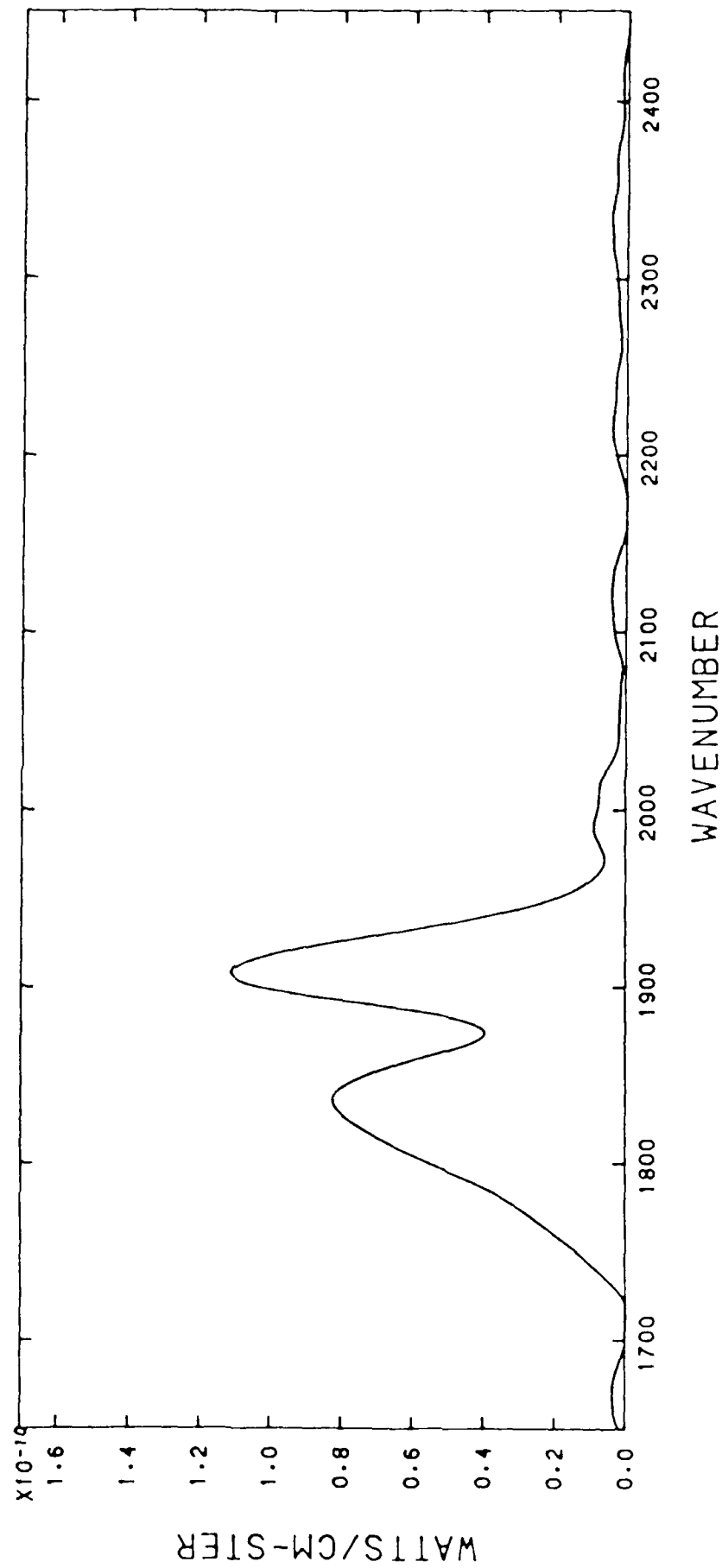


FILE 21, TIME 9: 8:15.998, ALT 113.4-113.6 KM

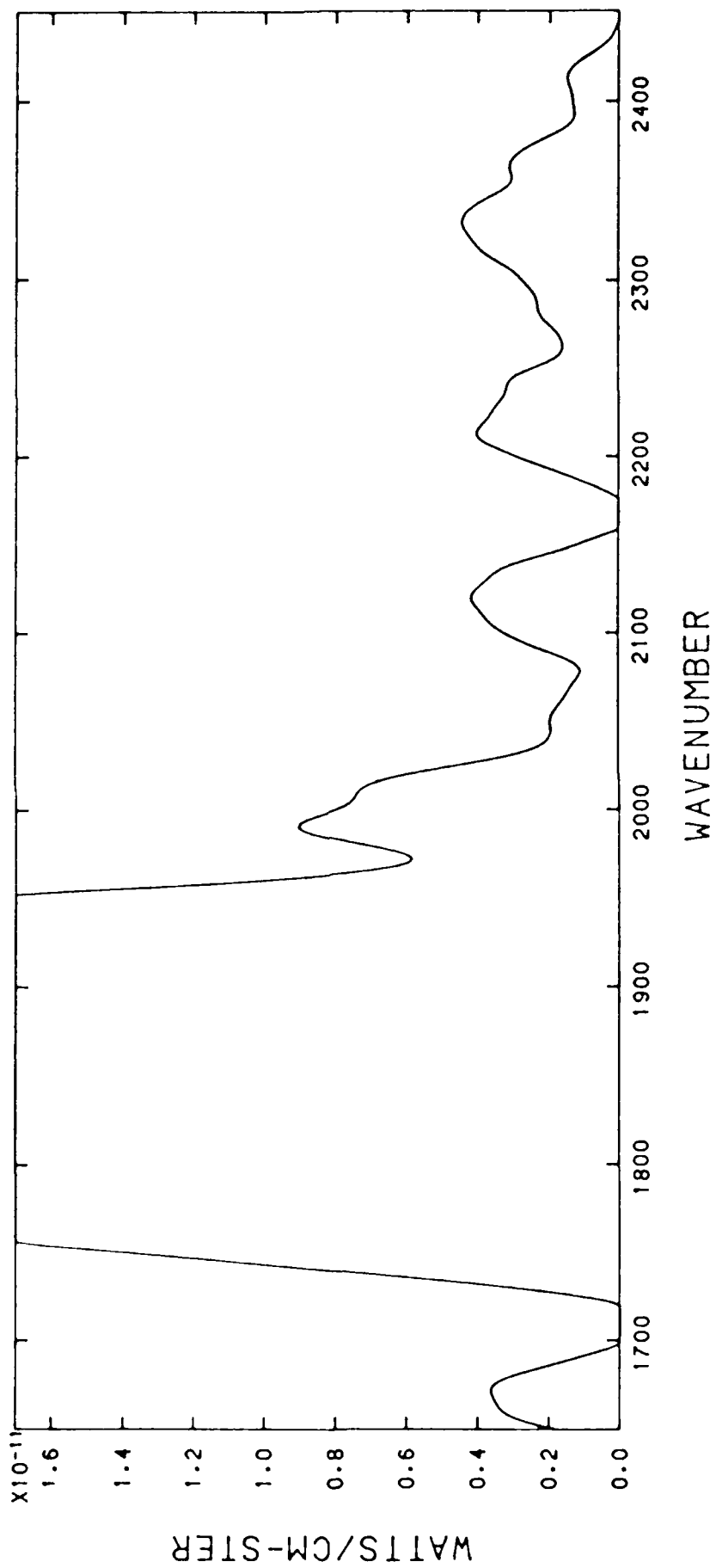


FILE 21, TIME 9: 8:15.998, ALT 113.4-113.6 KM

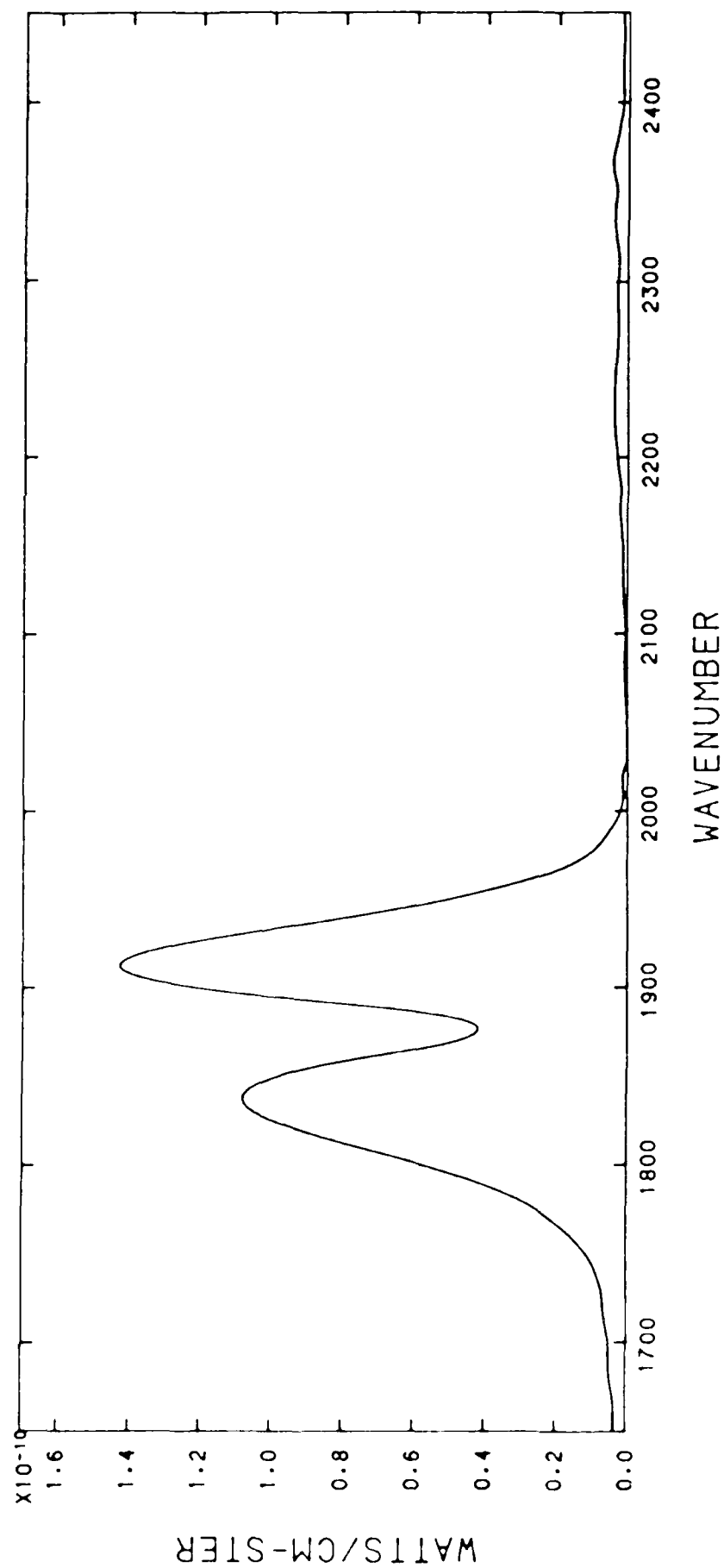




FILE 22, TIME 9: 8:18.754, ALT 115.3-115.5 KM

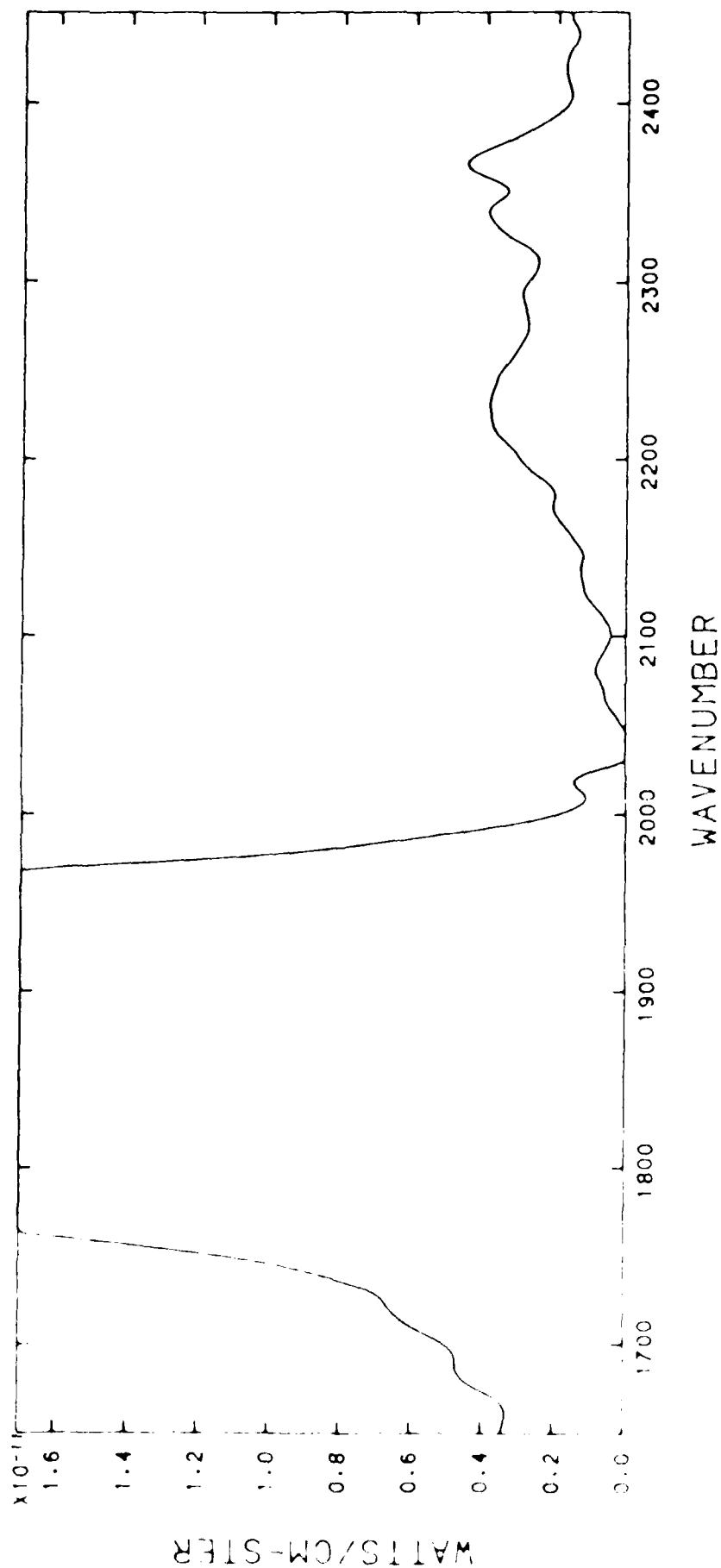


FILE 22, TIME 9: 8:18.754, ALT 115.3-115.5 KM

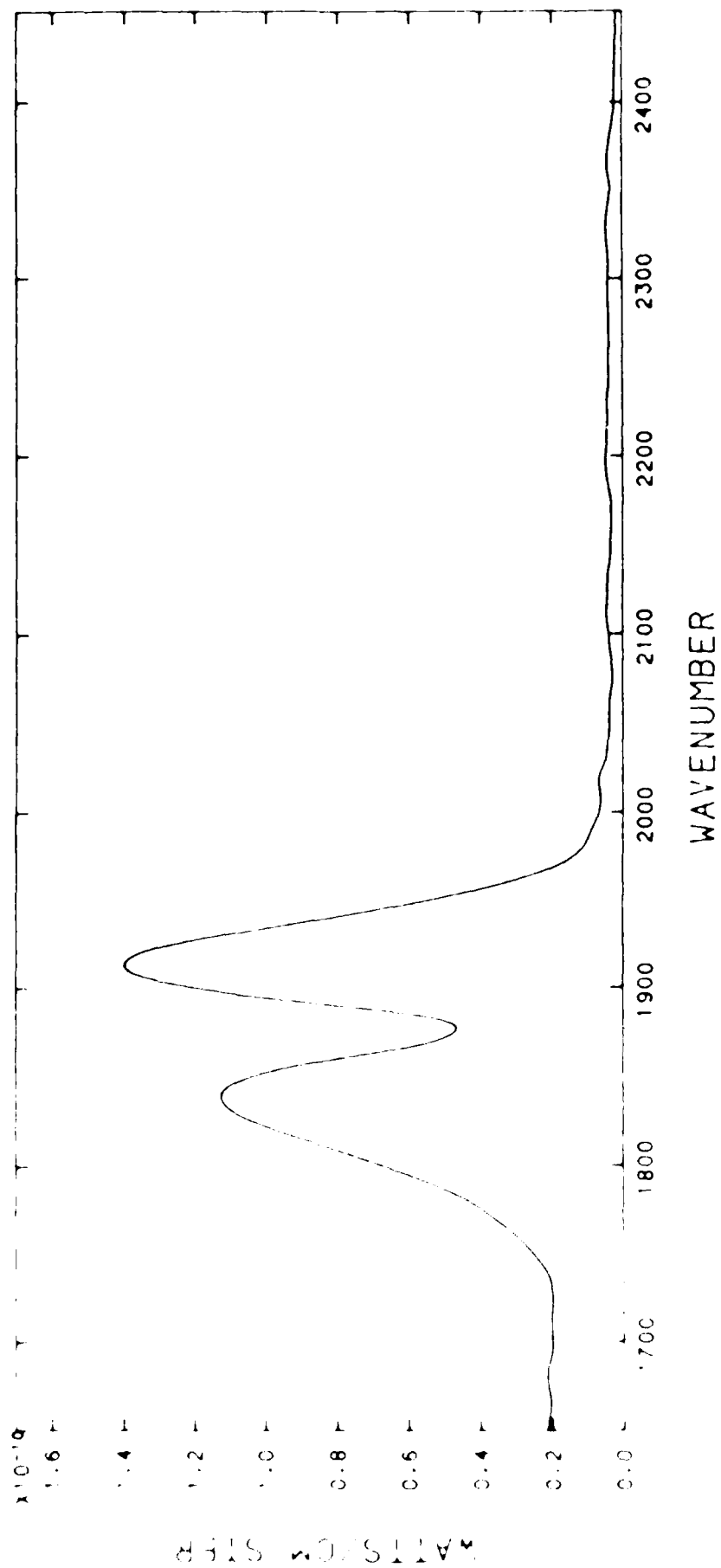


FILE 23, TIME 9: 8:19.252, ALT 115.6-115.9 KM

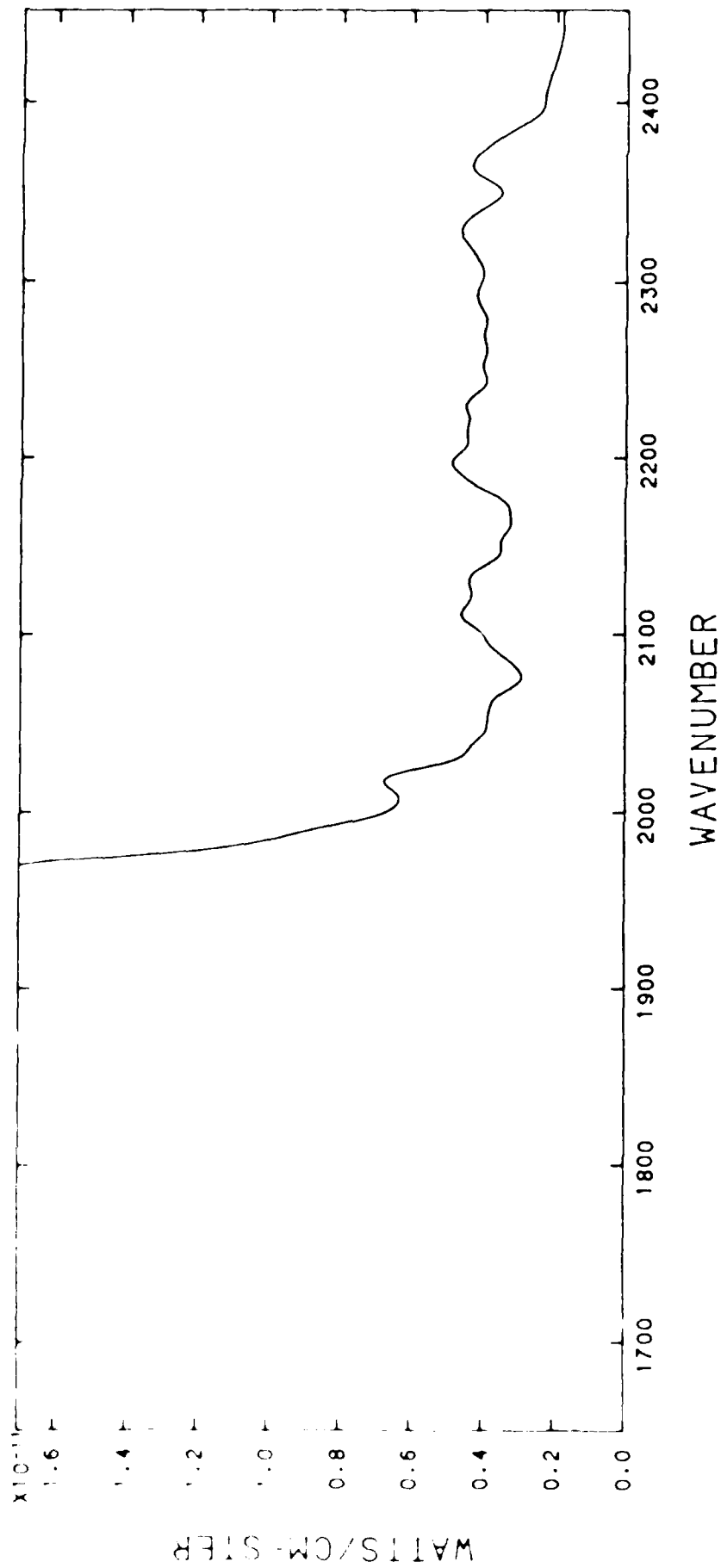
30-NOV-93 09:19



FILE 23, TIME 9: 8:19.252, ALT 115.6-115.9 KM

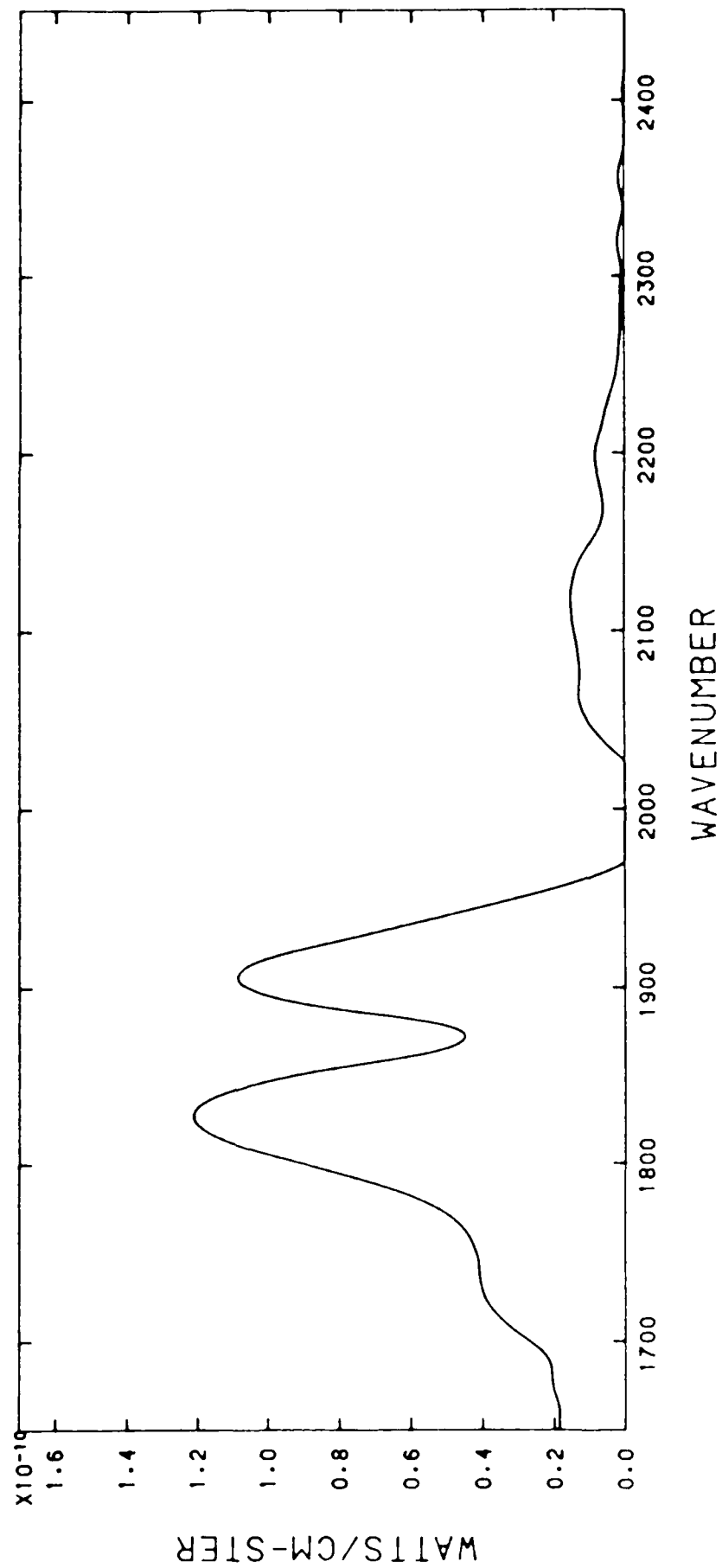


FILE 24, TIME 9: 8:22. 12, ALT 117.4-117.7 KM

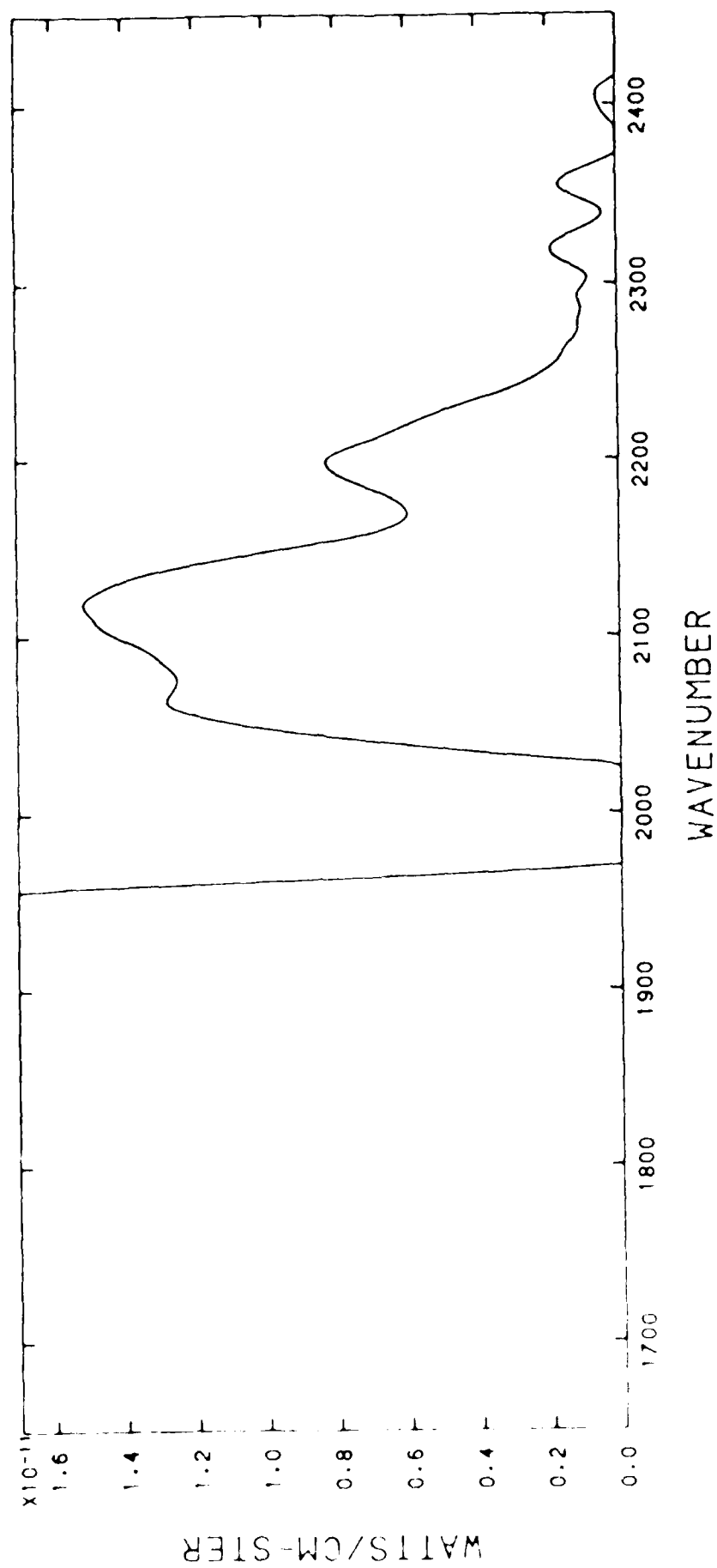


FILE 24, TIME 9: 8:22. 12, ALT 117.4-117.7 KM

30-NOV-83 09:19

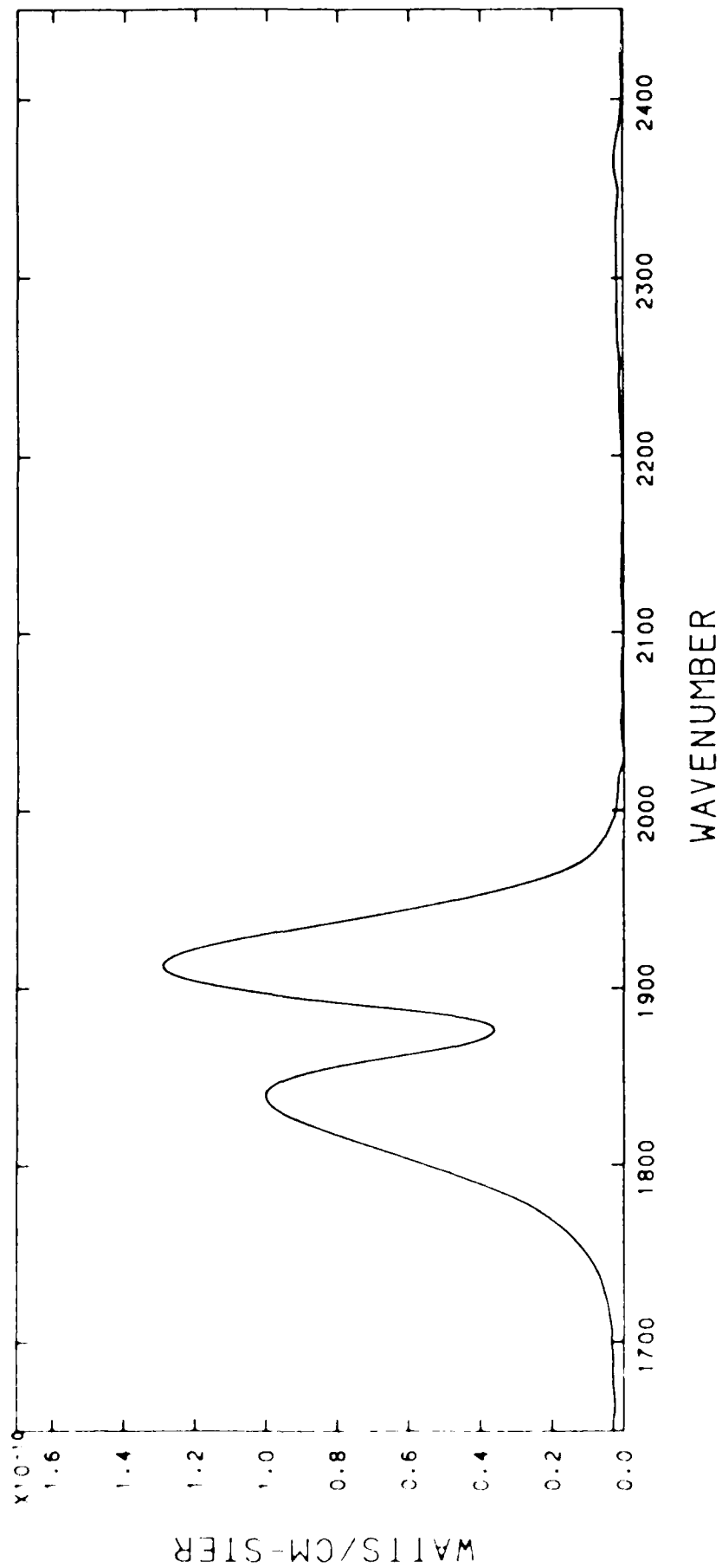


FILE 25, TIME 9: 8:22.510, ALT 117.8-118.0 KM



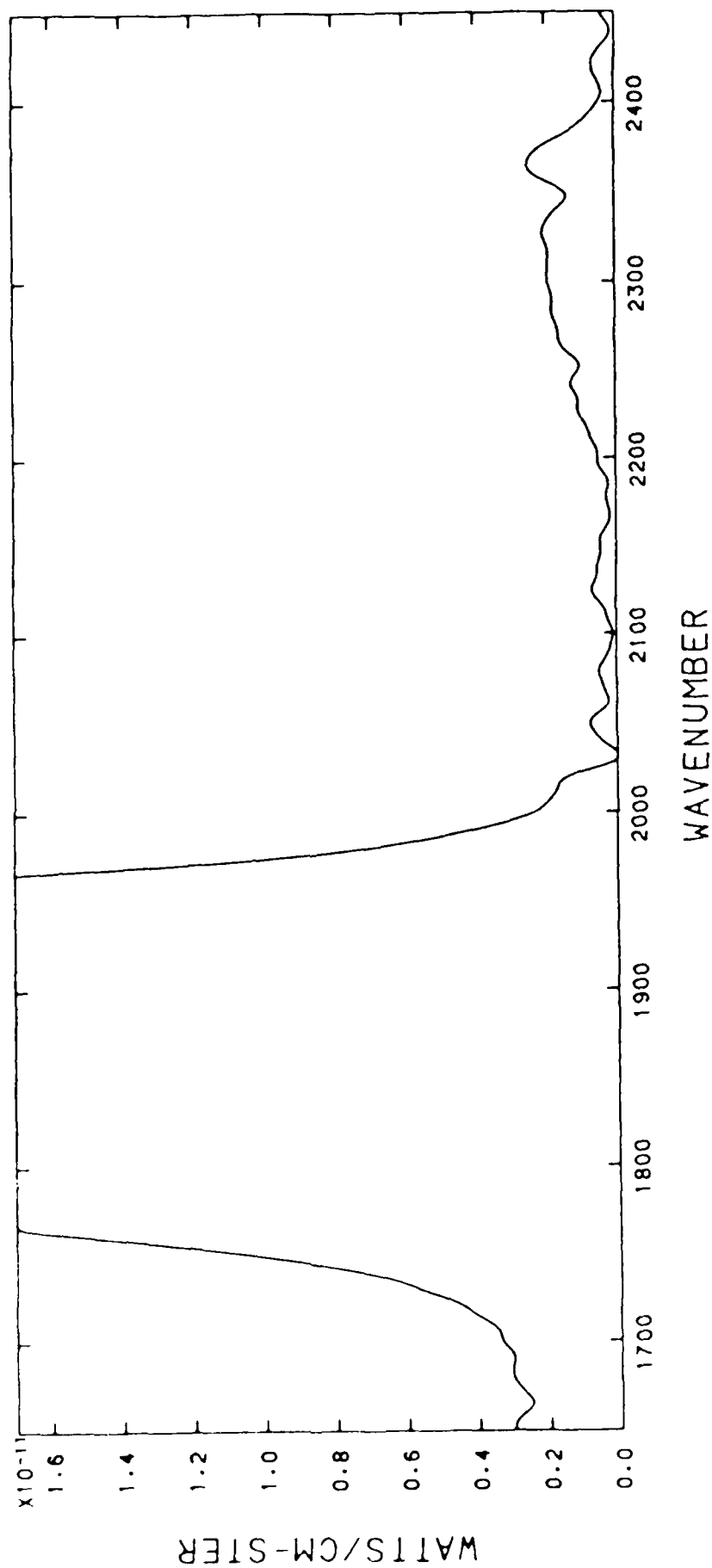
FILE 25, TIME 9: 8:22.510, ALT 117.8-118.0 KM



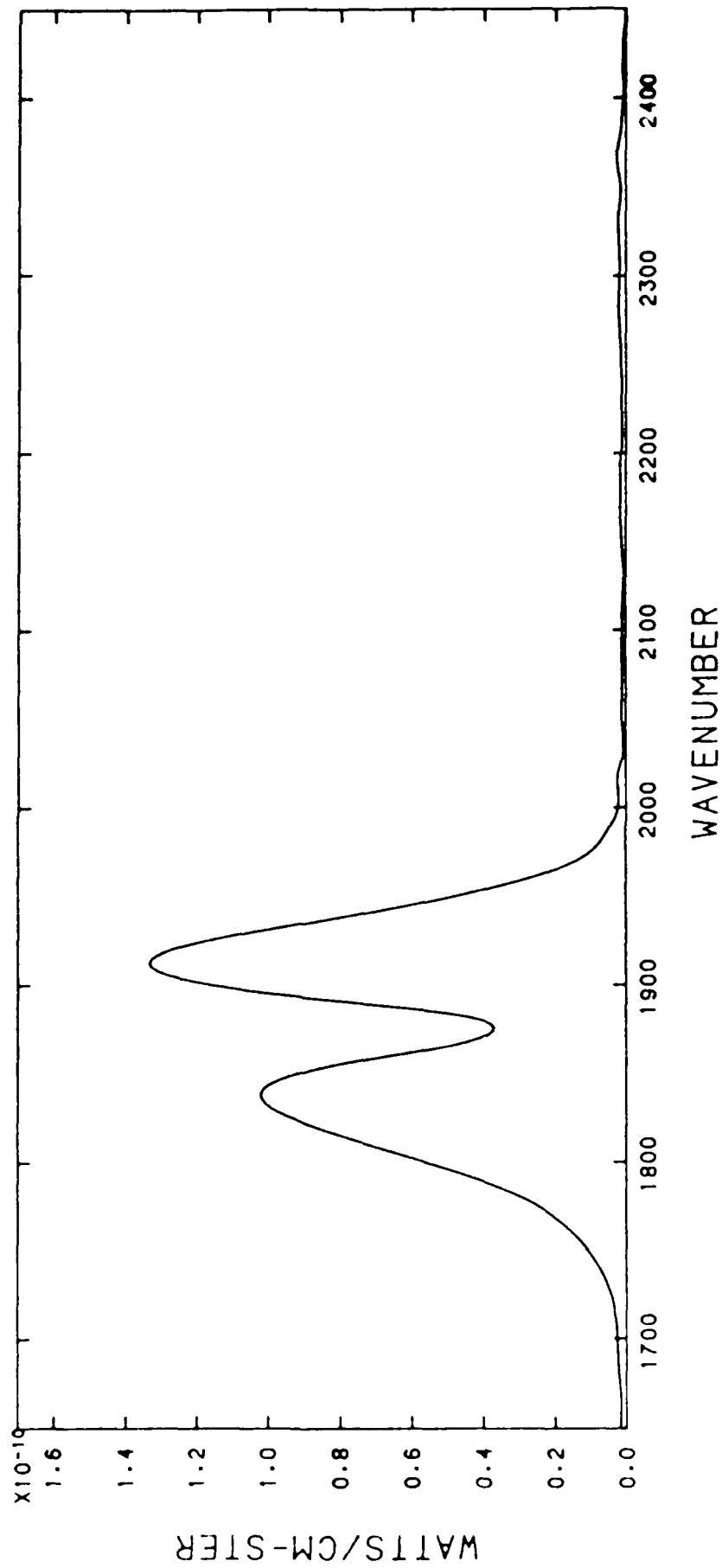


FILE 26, TIME 9: 8:25.266, ALT 119.5-119.7 KM

30-NOV-83 00:20

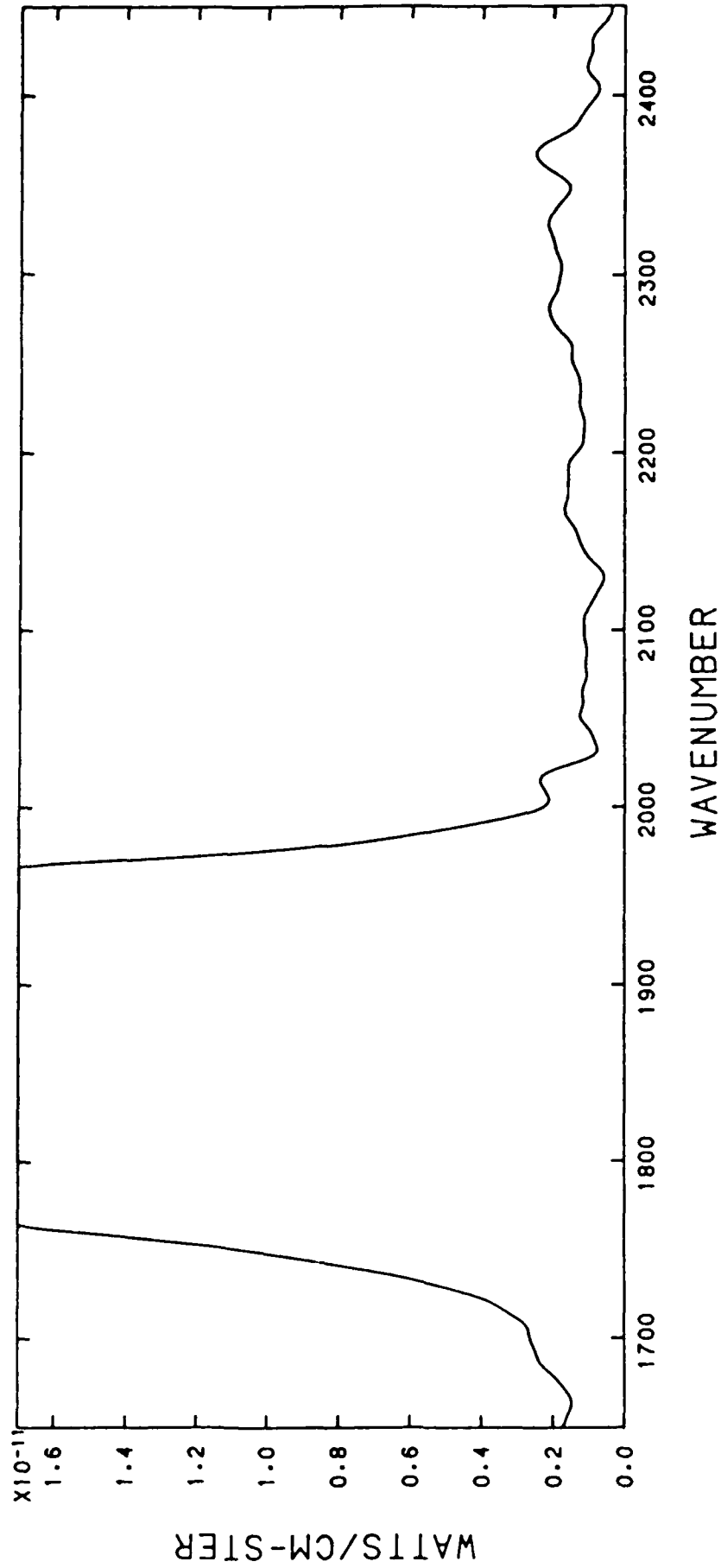


FILE 26, TIME 9: 8:25.266, ALT 119.5-119.7 KM

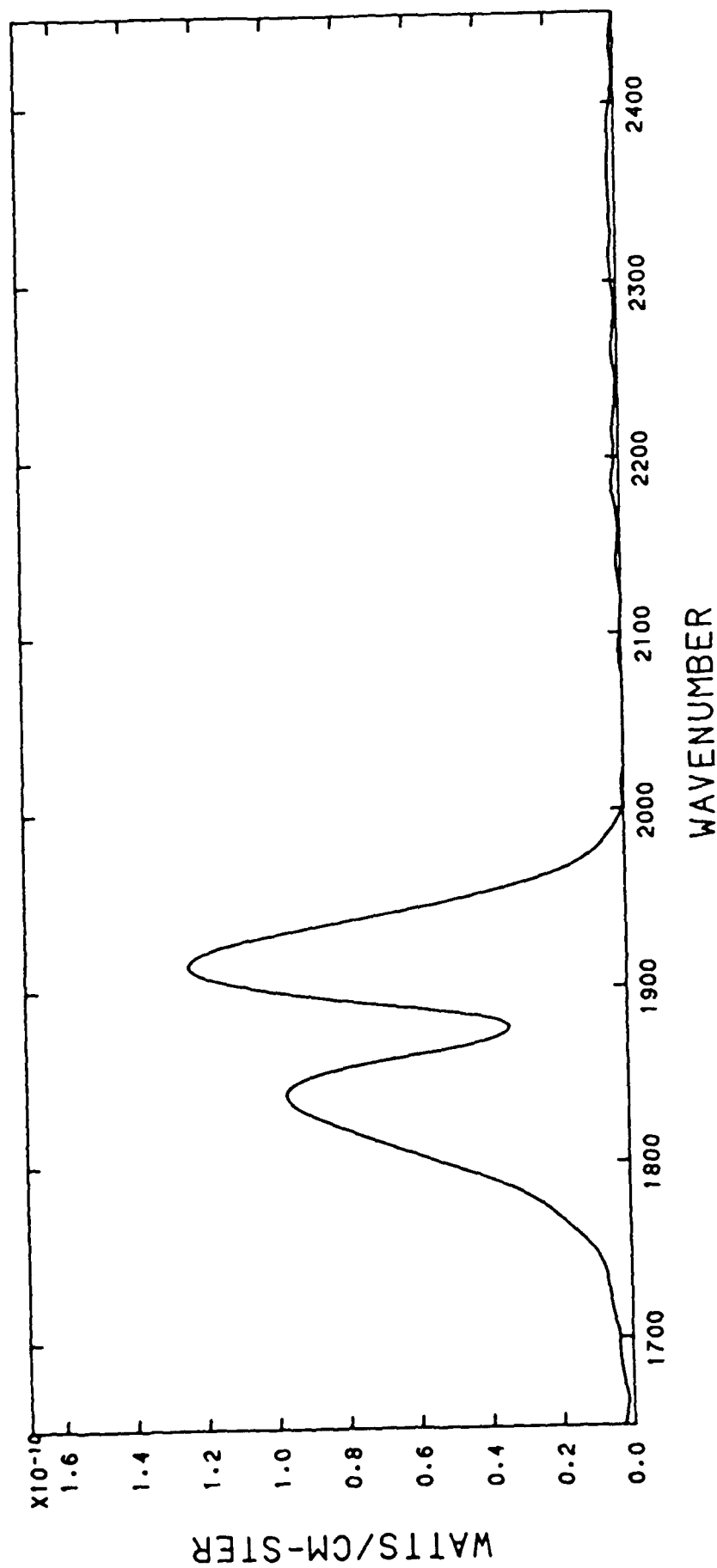


FILE 27, TIME 9: 8:25.766, ALT 119.8-120.0 KM

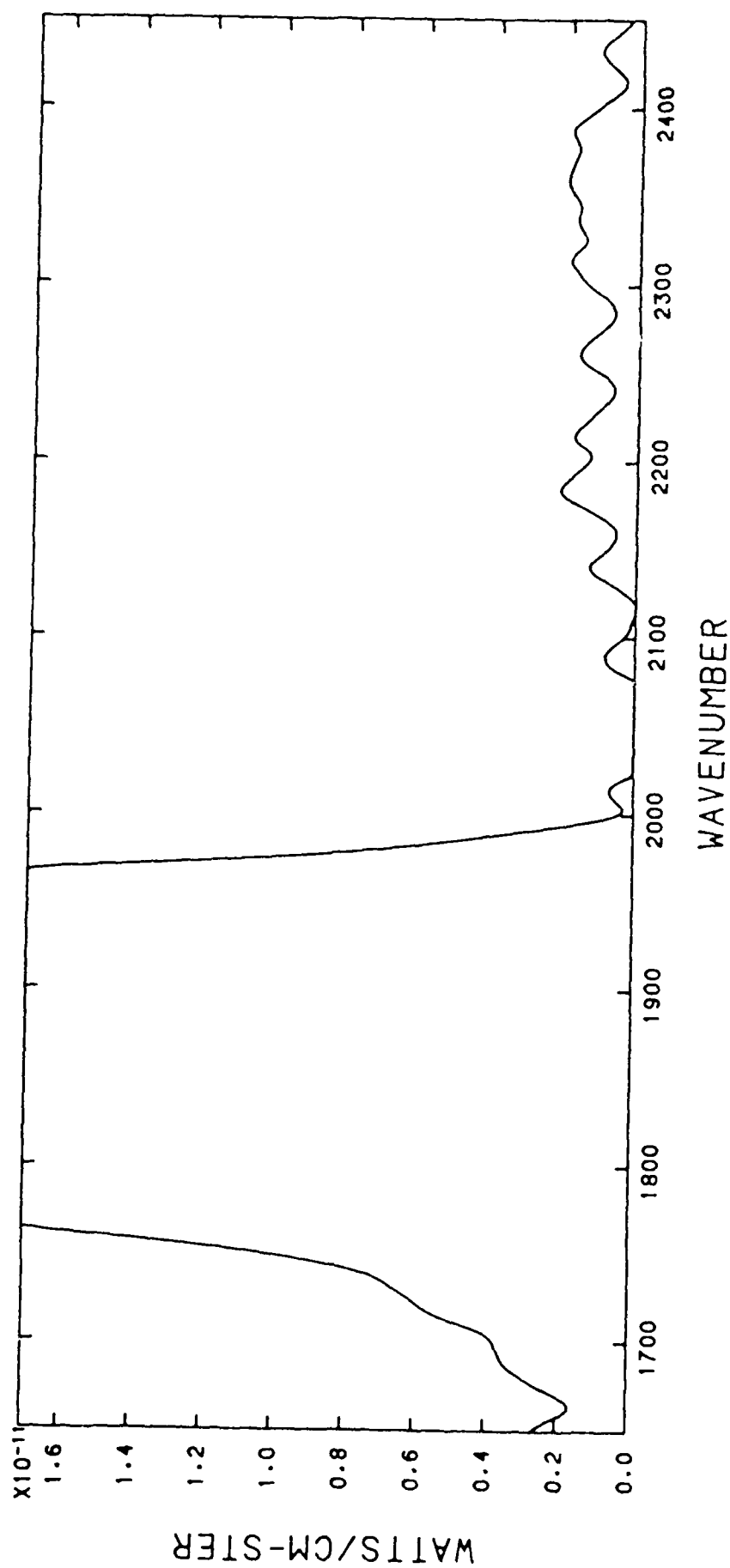
30-NOV-83 09:20



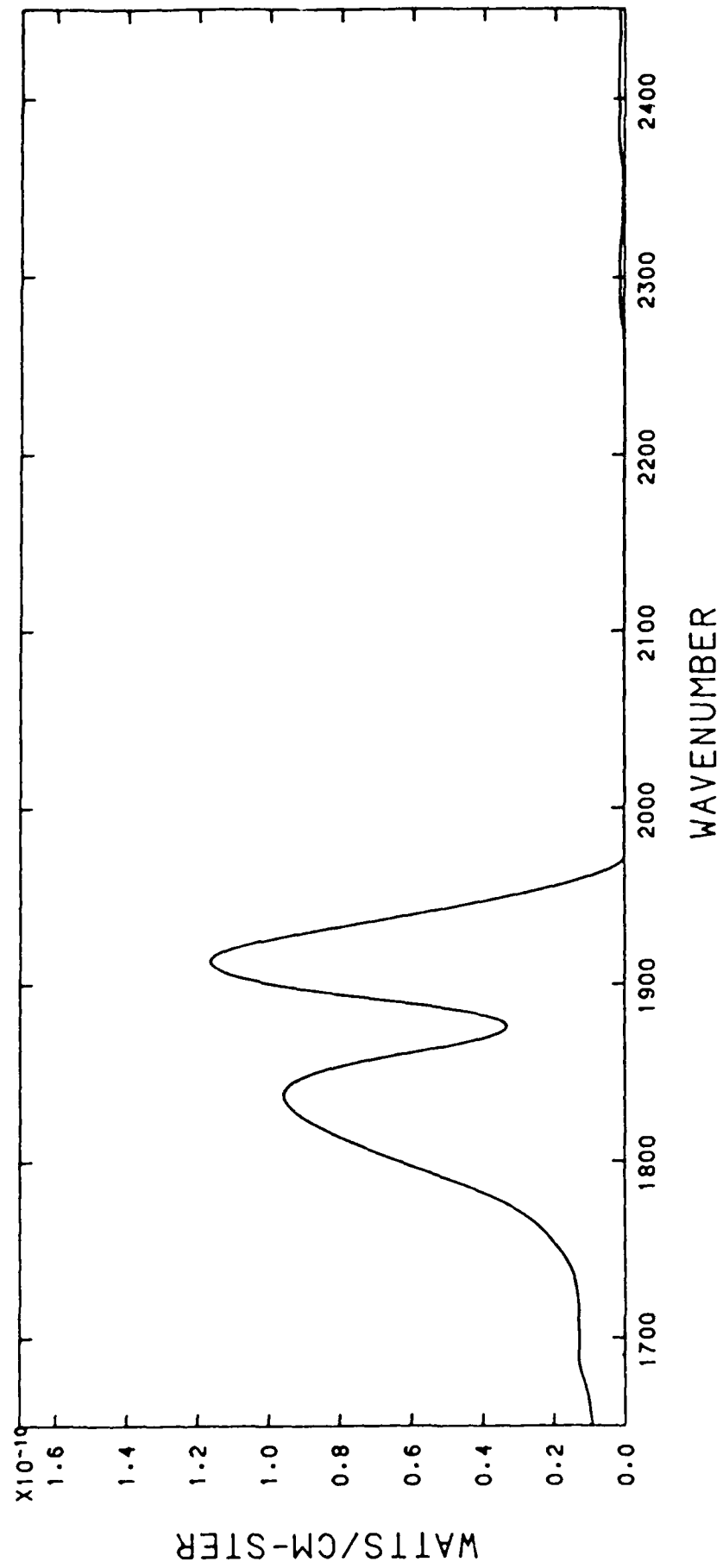
FILE 27. TIME 9: 8:25.766. ALT 119.8-120.0 KM



FILE 28, TIME 9: 8:28.522, ALT 121.4-121.6 KM

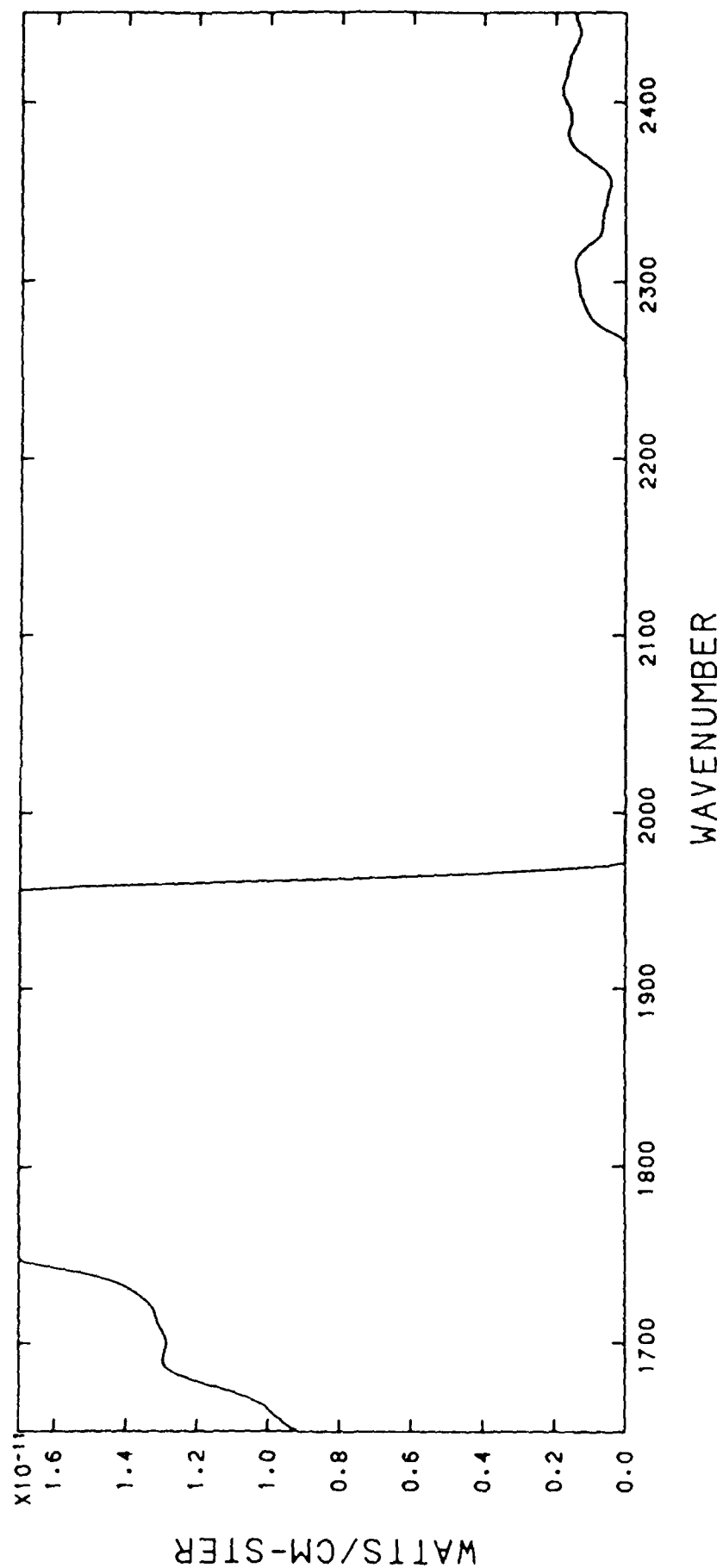


FILE 28, TIME 9: 8:28.522, ALT 121.4-121.6 KM



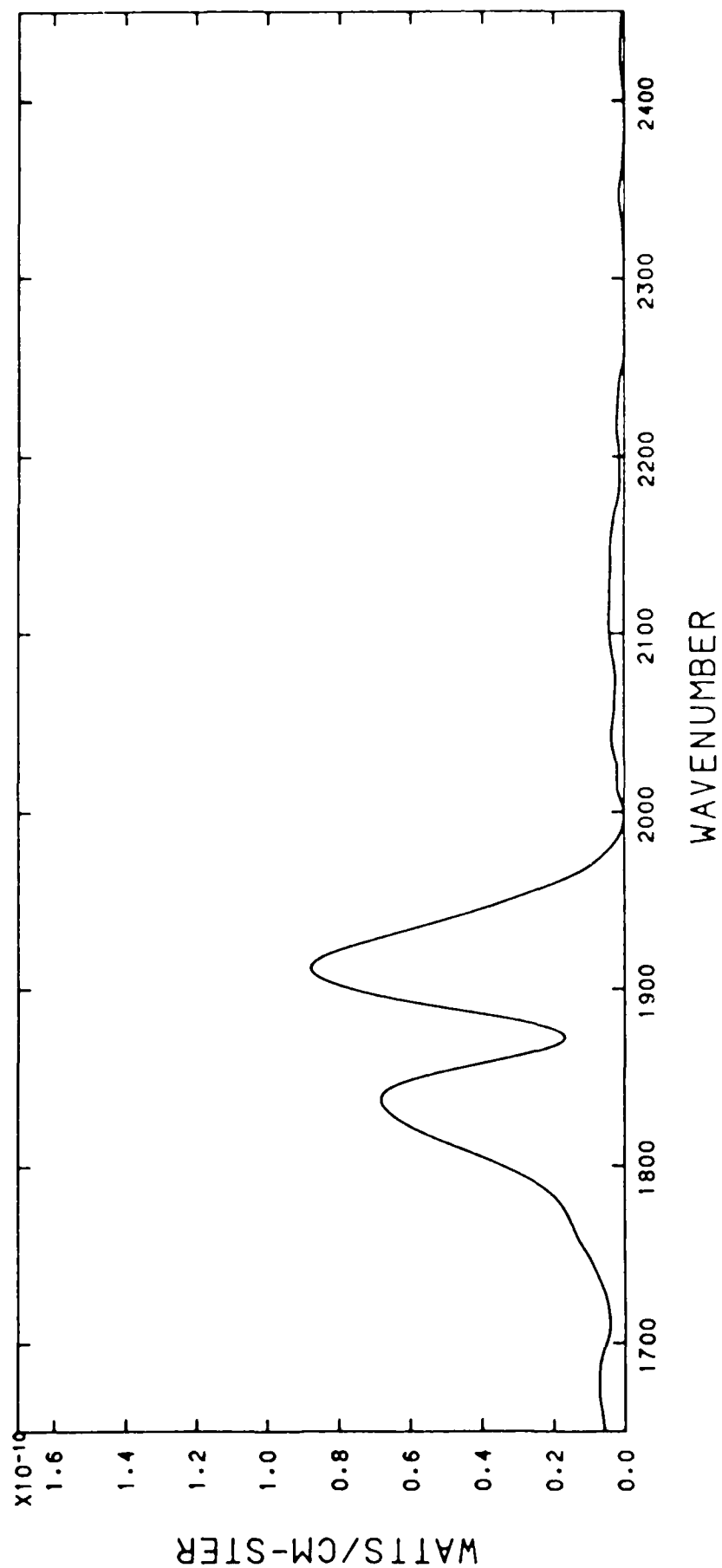
FILE 29. TIME 9: 8:29. 20, ALT 121.7-121.9 KM

30-NOV-83 09:21

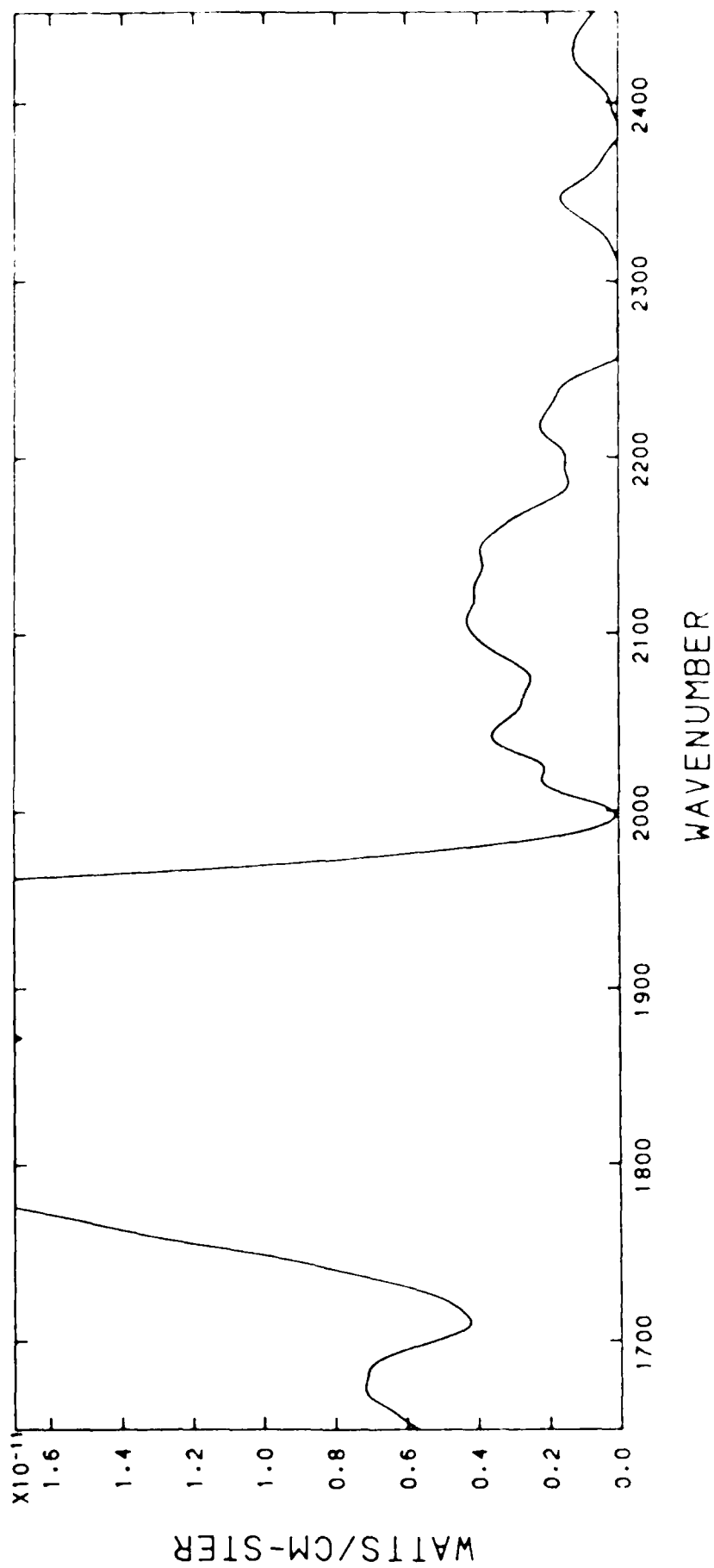


FILE 29, TIME 9: 8:29. 20. ALT 121.7-121.9 KM

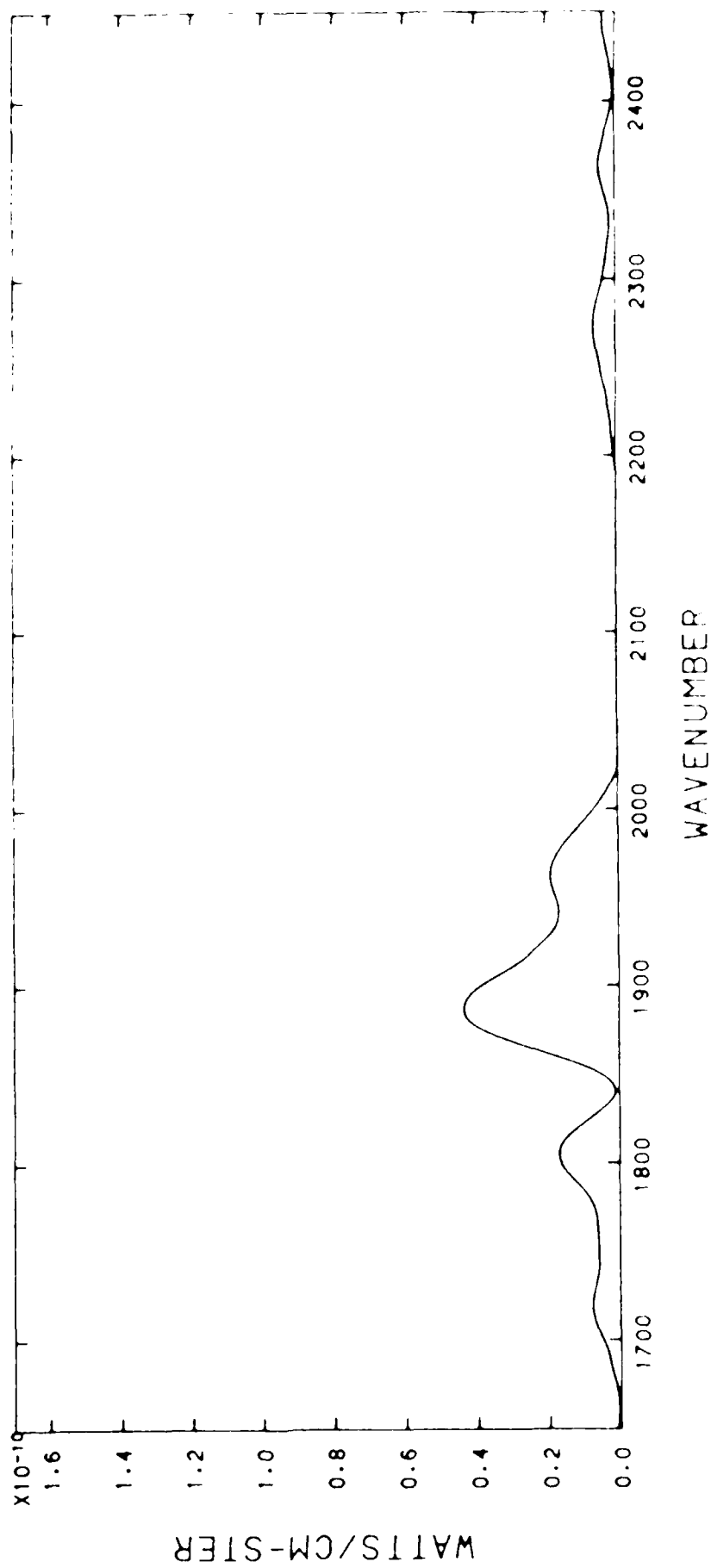




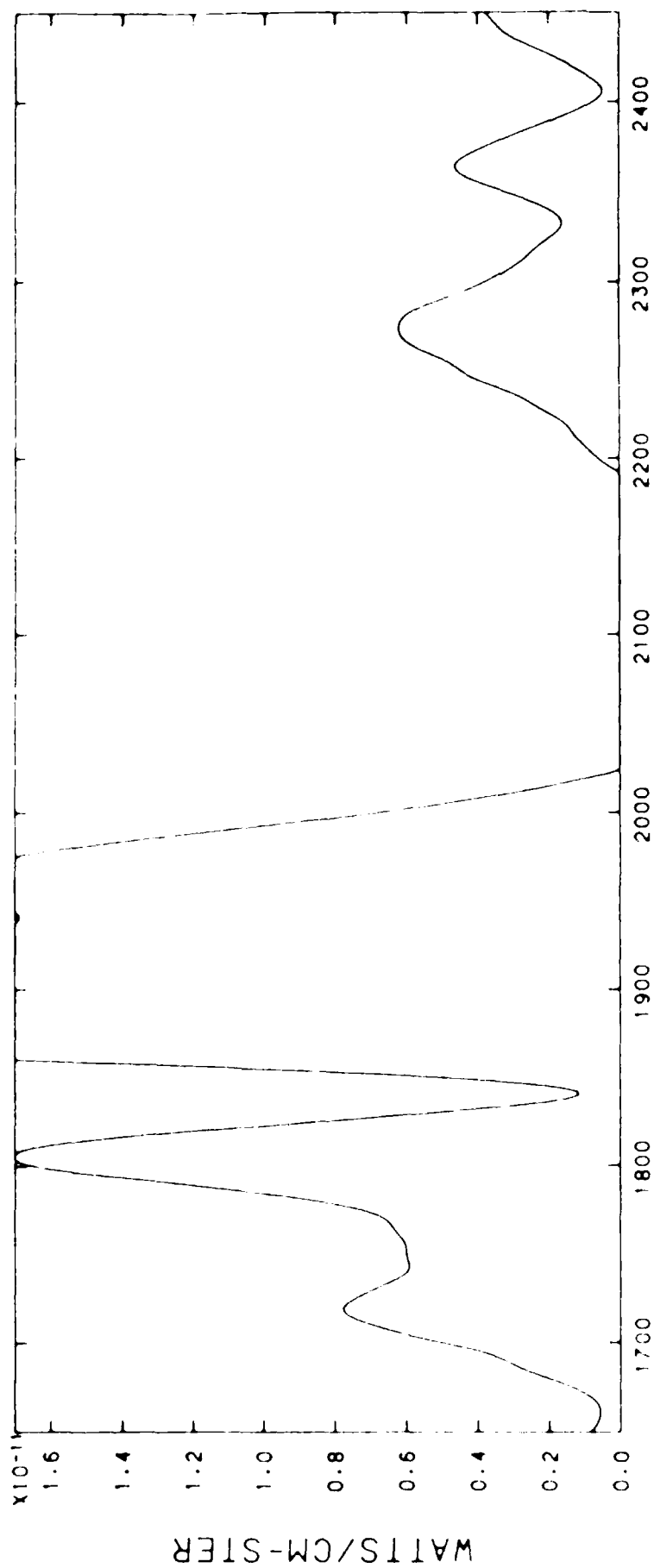
FILE 30, TIME 9: 8:31.782, ALT 123.3-123.4 KM



FILE 30, TIME 9: 8:31.782, ALT 123.3-123.4 KM



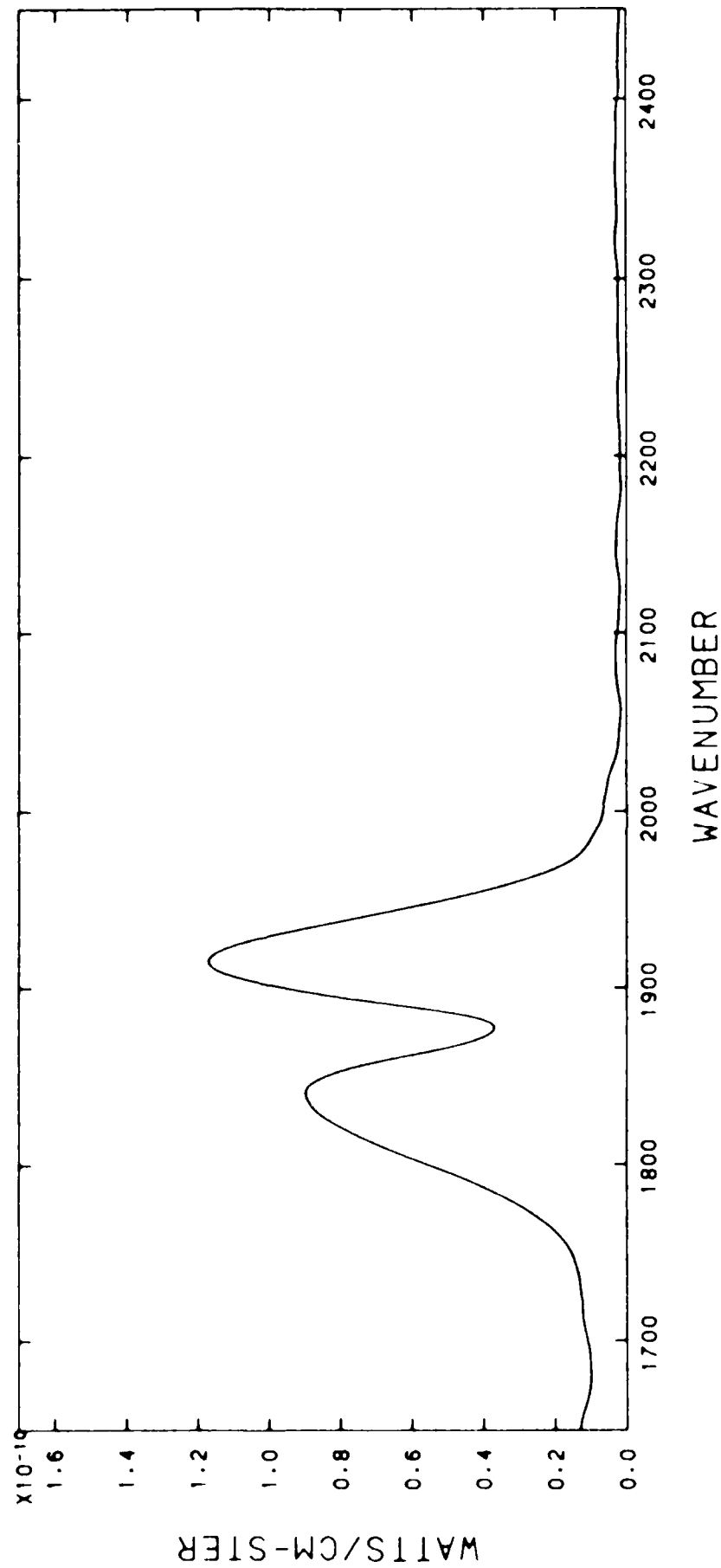
FILE 31, TIME 9: 8:32.278, ALT 123.5-123.7 KM



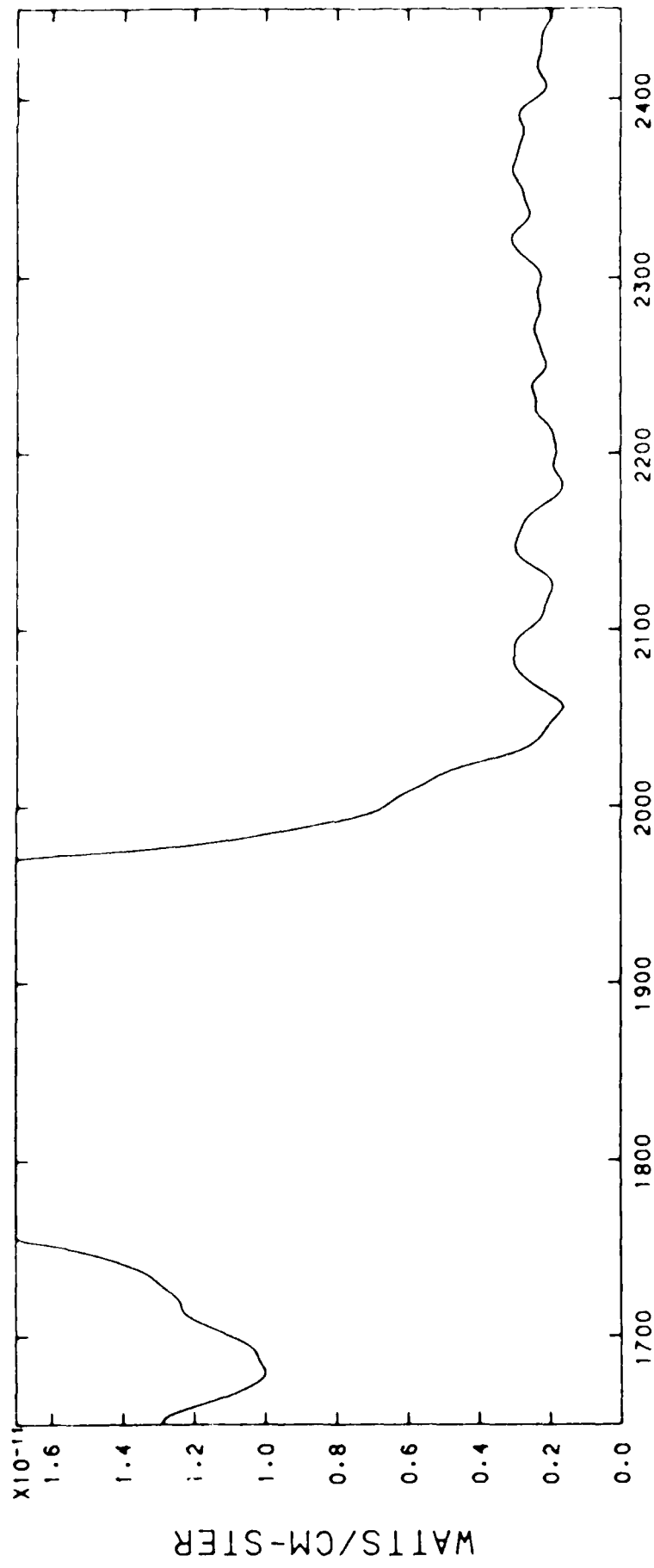
WAVENUMBER

FILE 31, TIME 9: 8:32.278, ALT 123.5-123.7 KM

30-MAY-83 09:21

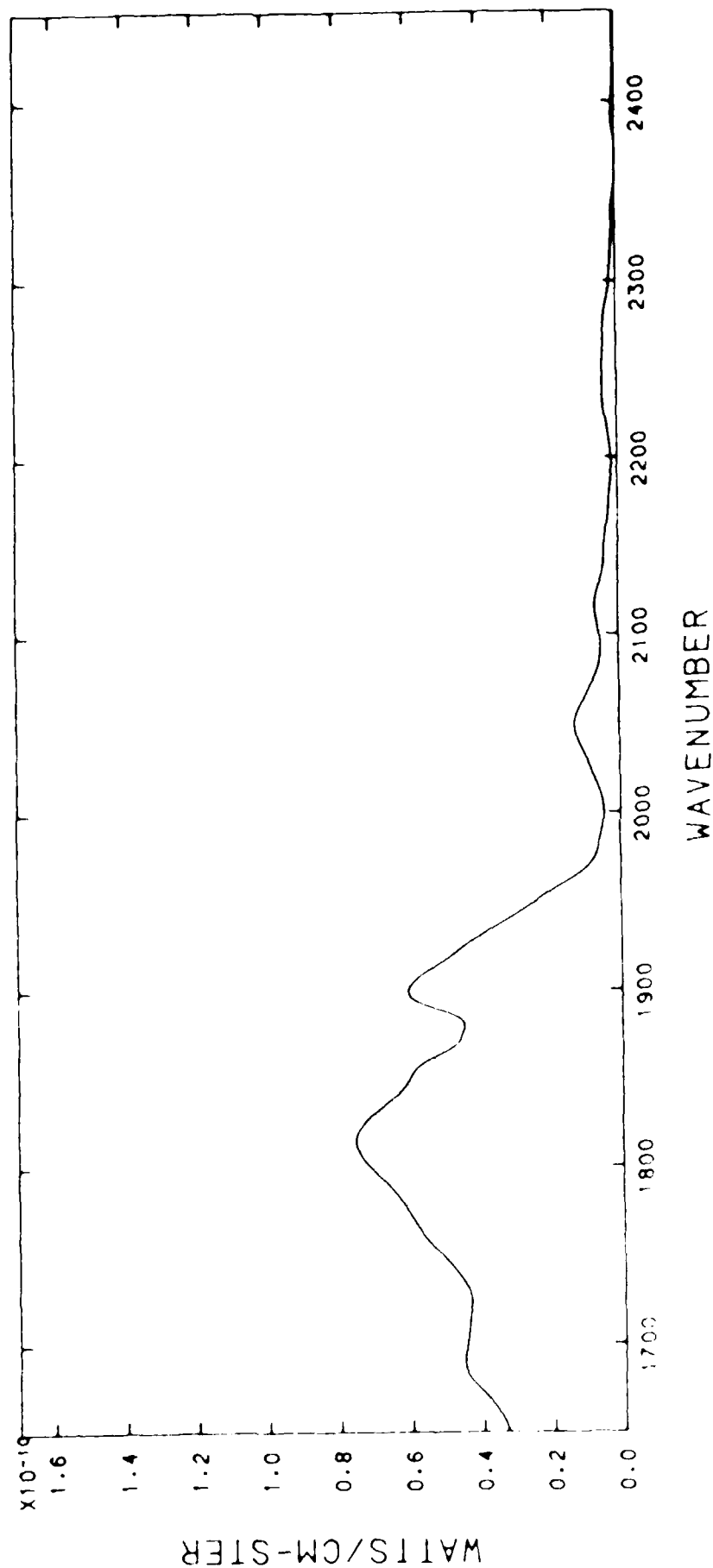


FILE 32, TIME 9: 8:35. 42, ALT 125.0-125.2 KM

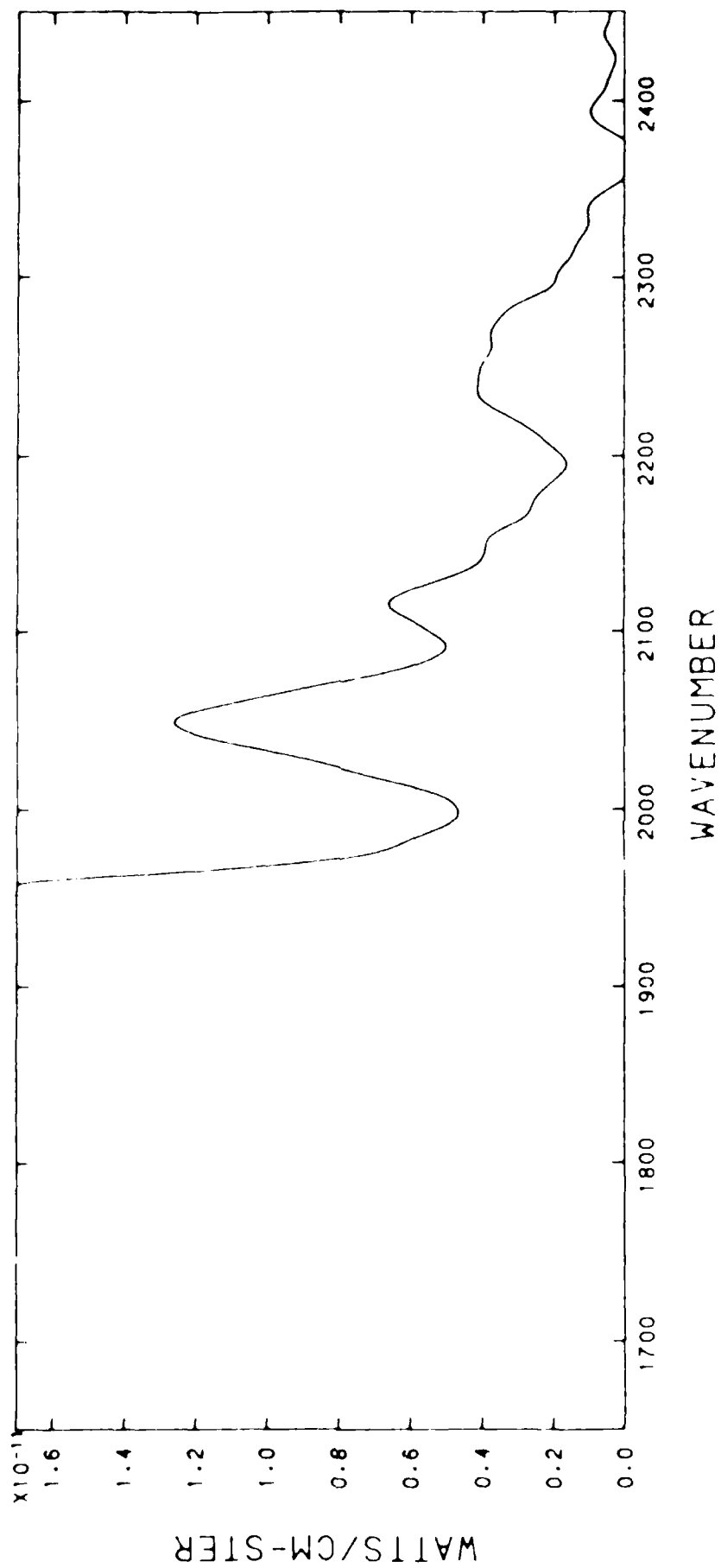


WAVENUMBER

FILE 32, TIME 9: 8:35. 42, ALT 125.0-125.2 KM

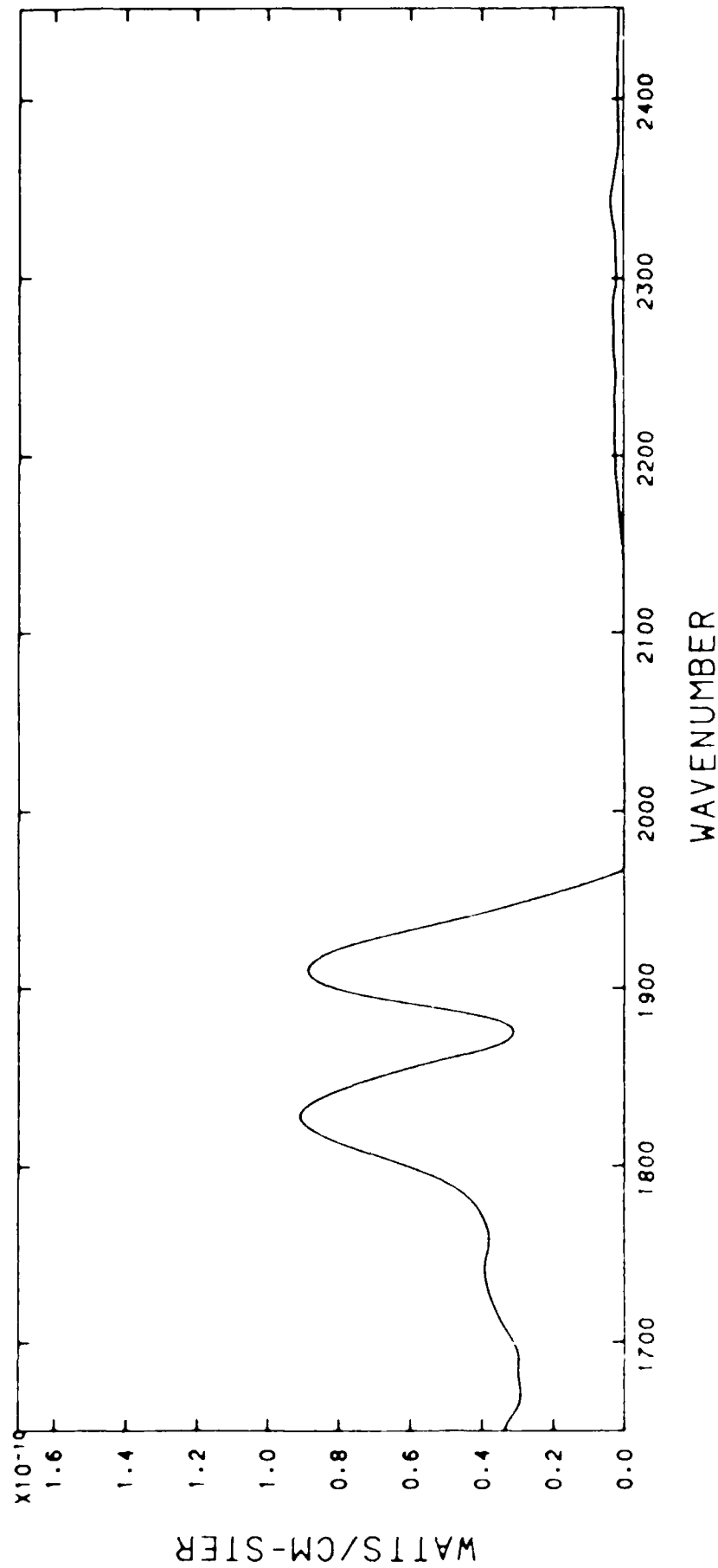


FILE 33, TIME 9: 8:35.538, ALT 125.3-125.4 KM



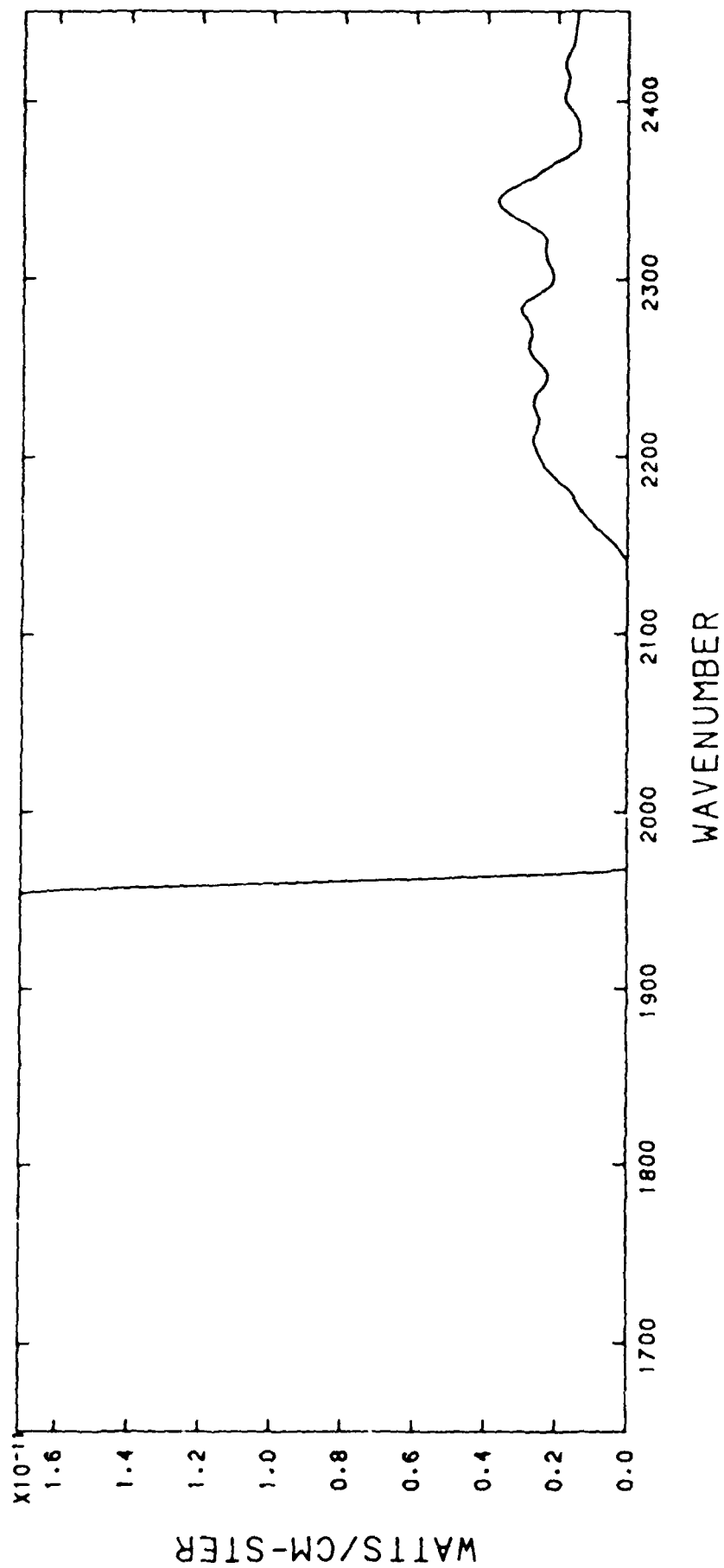
FILE 33, TIME 9: 8:35.538, ALT 125.3-125.4 KM





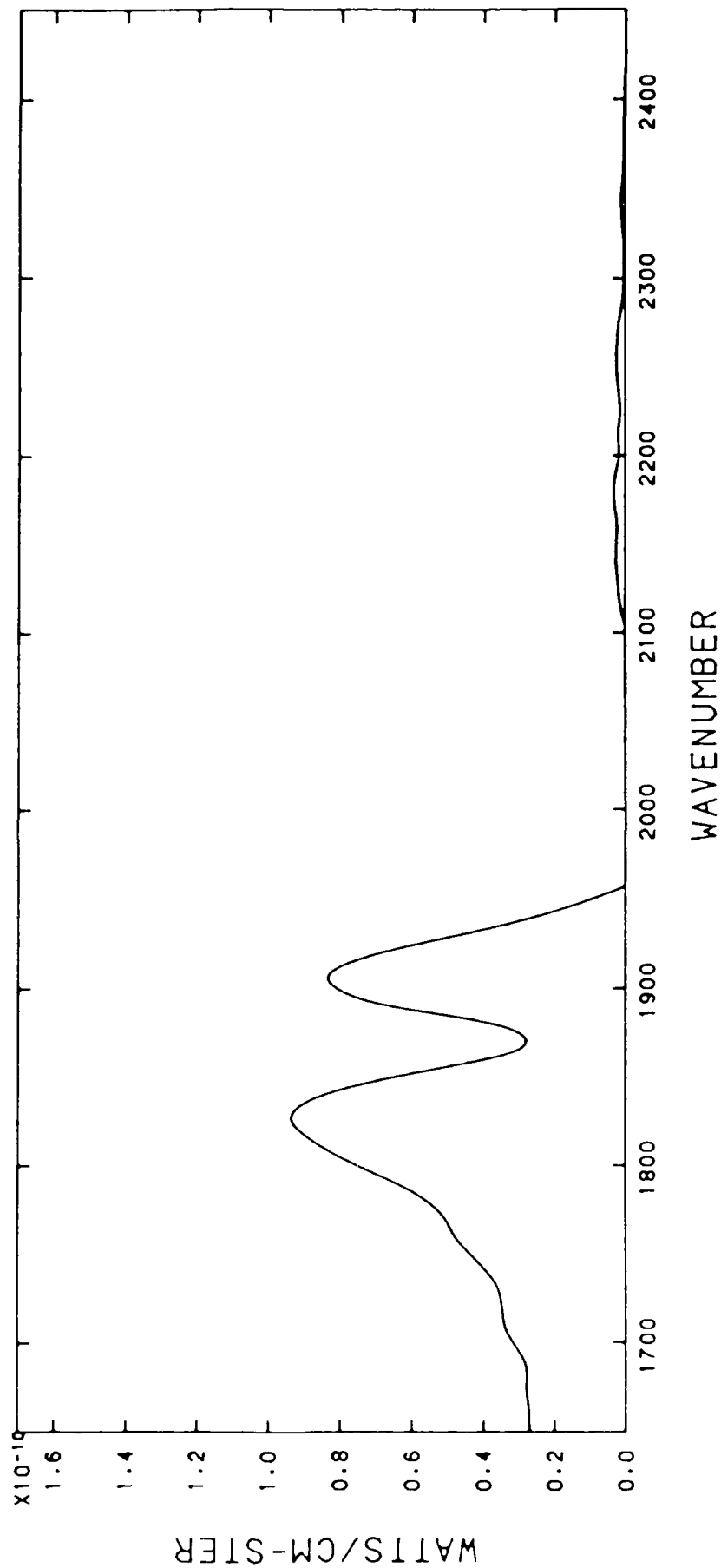
FILE 34, TIME 9: 8:38.298, ALT 126.6-126.8 KM

30-NOV-83 08:22



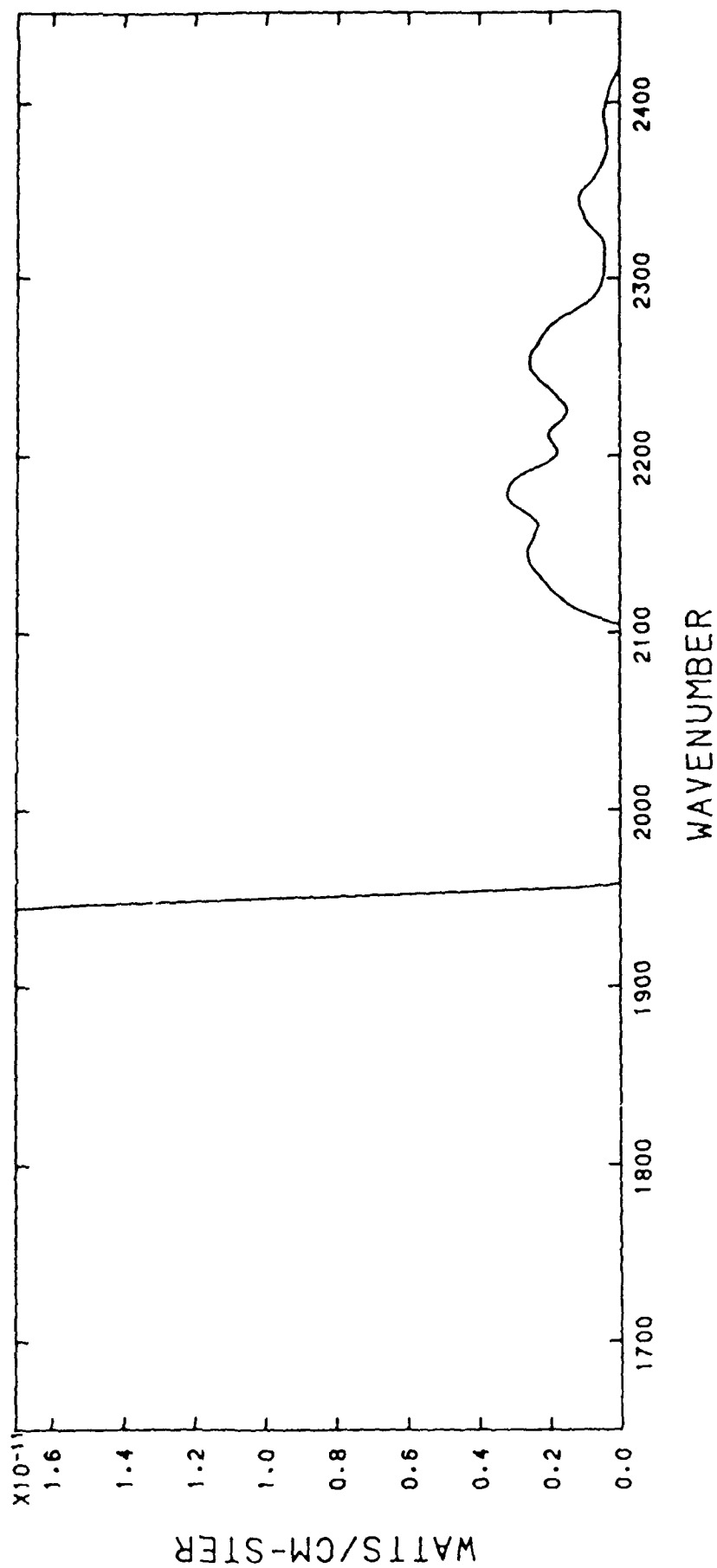
FILE 34, TIME 9: 8:38.298, ALT 126.6-126.8 KM

30-NOV-83 09:22

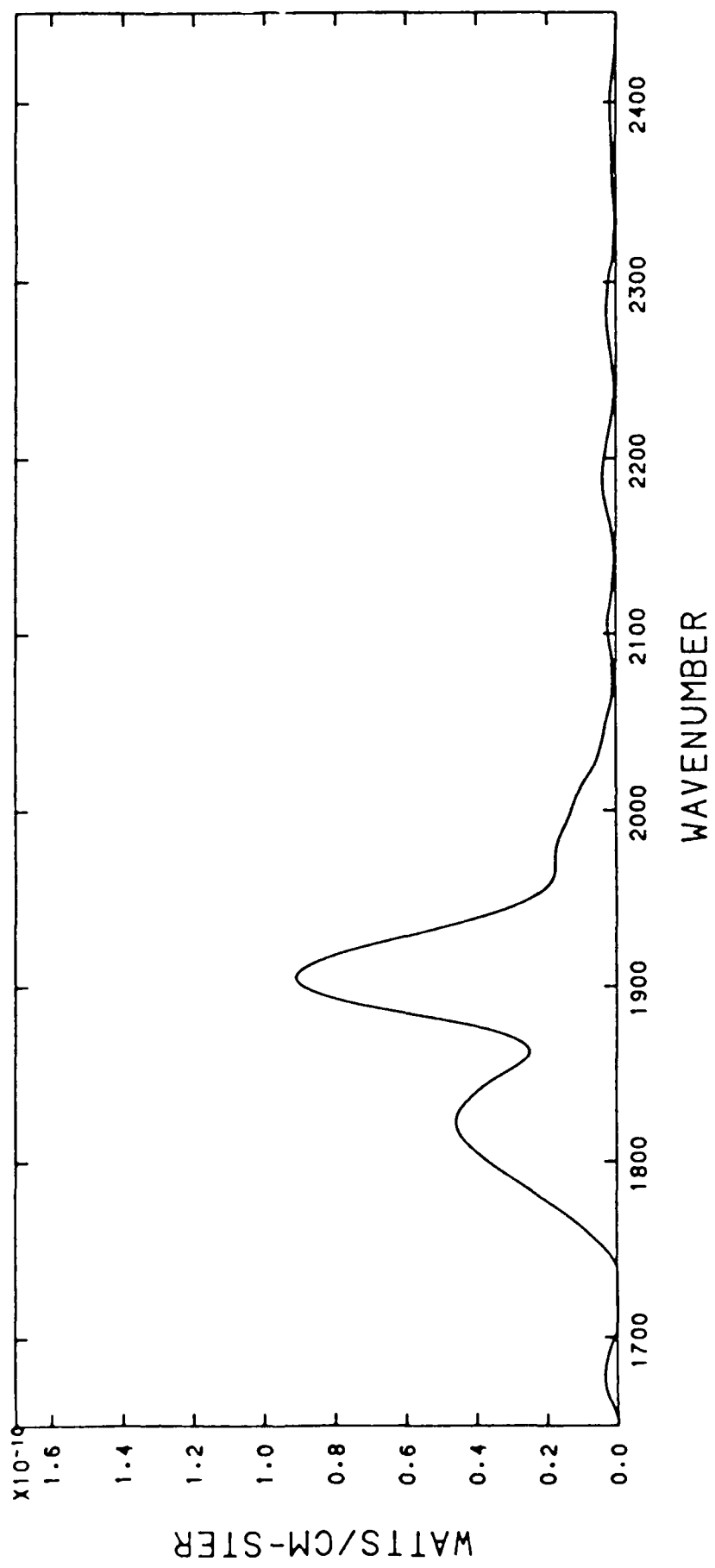


FILE 35, TIME 9: 8:38.796, ALT 126.9-127.0 KM

30-NOV-83 09:22

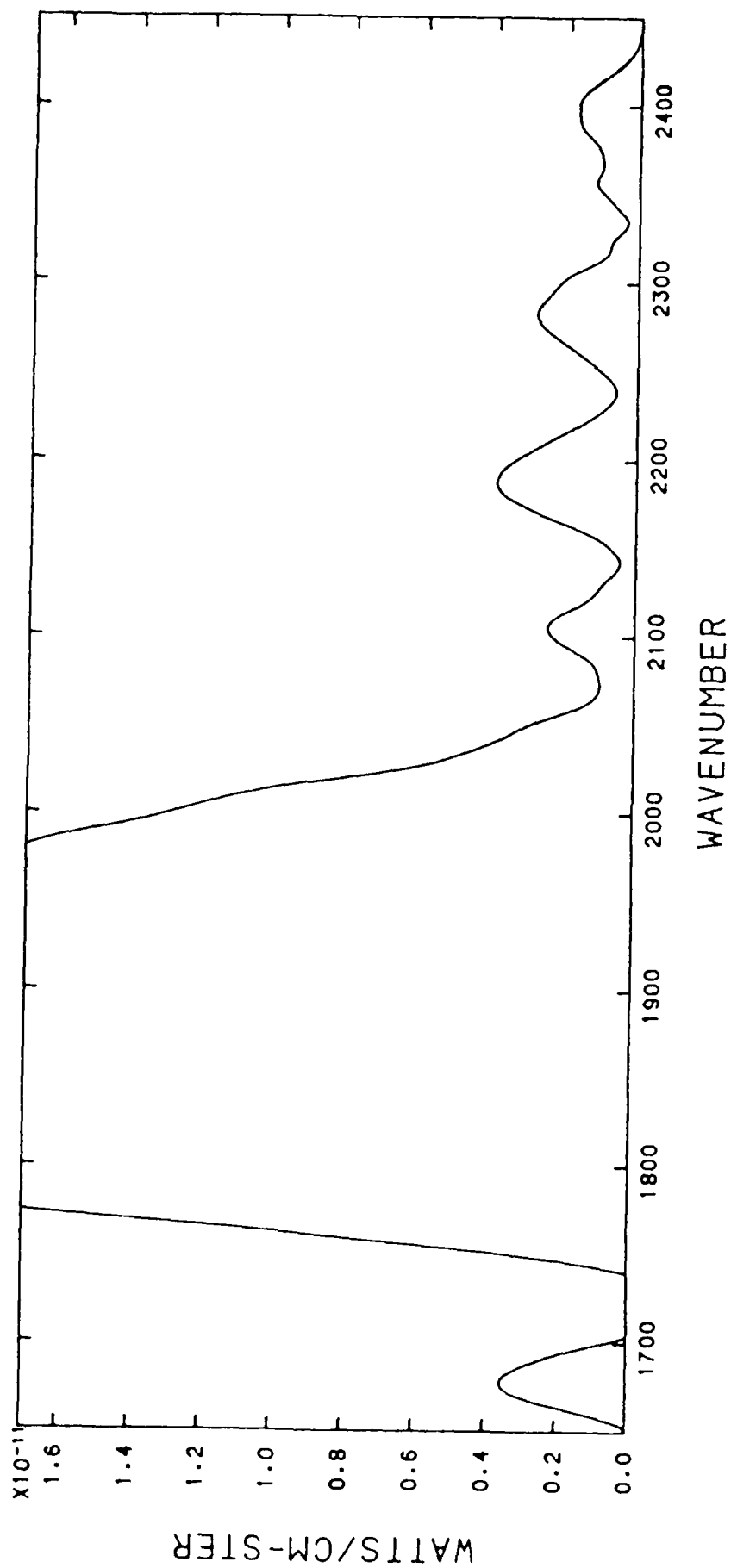


FILE 35, TIME 9: 8:38.796, ALT 126.9-127.0 KM

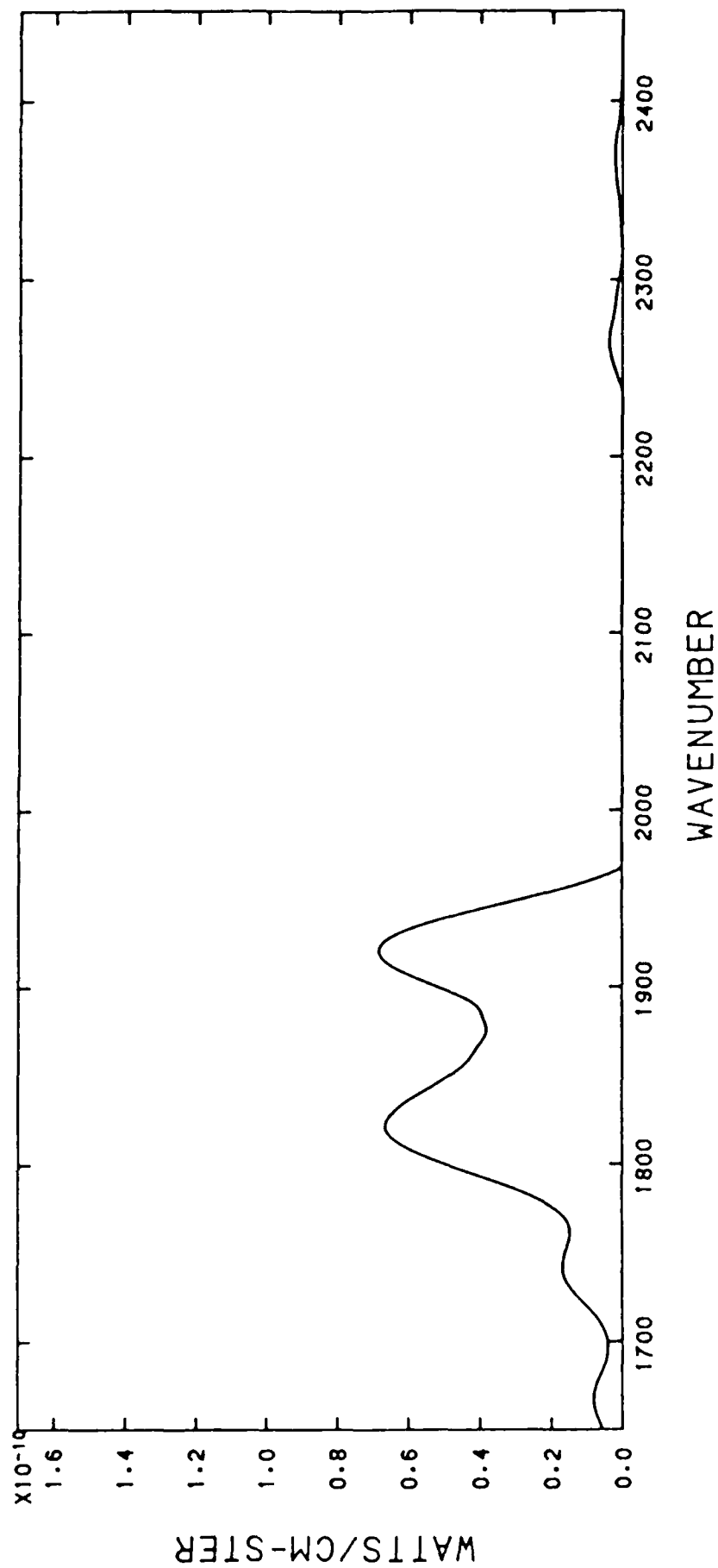


FILE 36, TIME 9: 8:41.554, ALT 128.2-128.3 KM

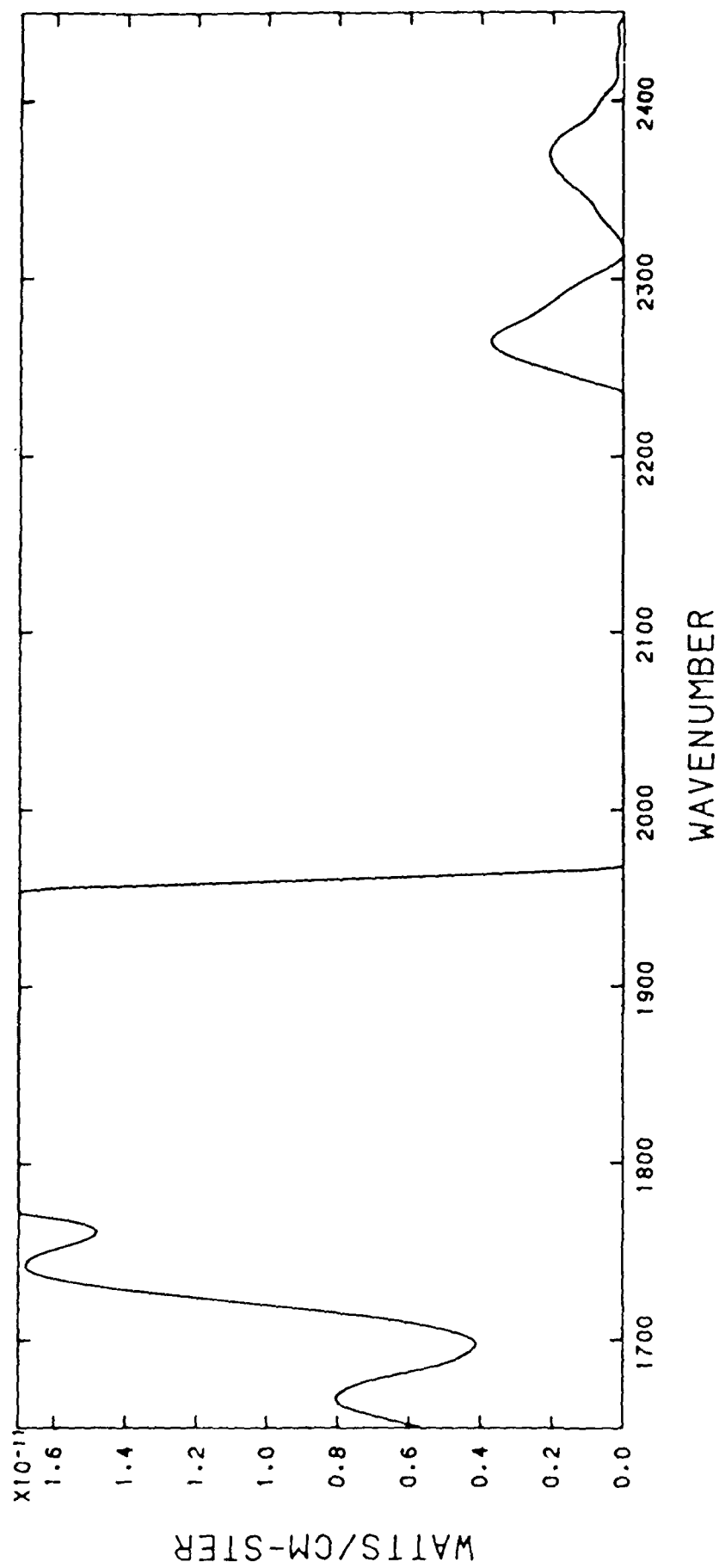
30-NOV-83 09:22



FILE 36, TIME 9: 8:41.554, ALT 128.2-128.3 KM



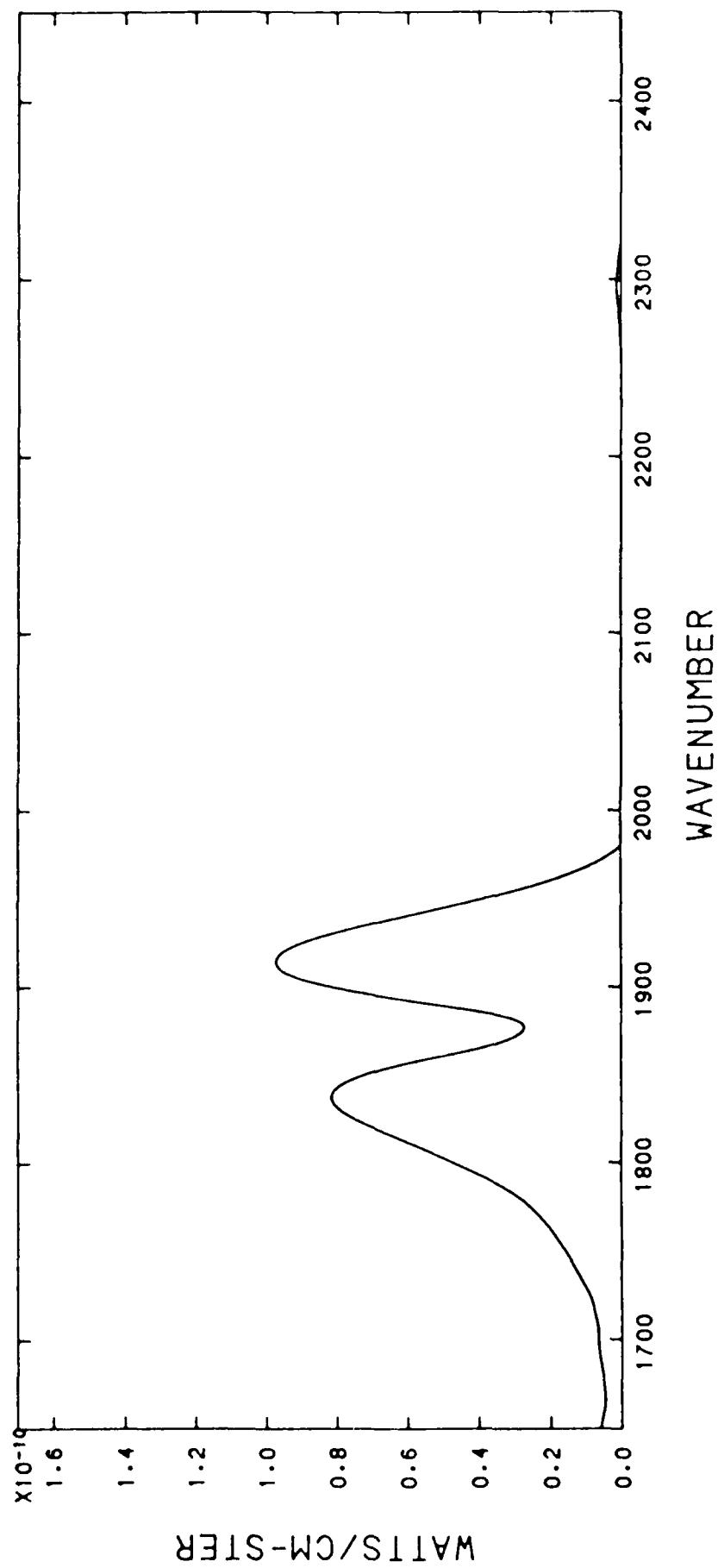
FILE 37, TIME 9: 8:42. 50, ALT 128.4-128.6 KM



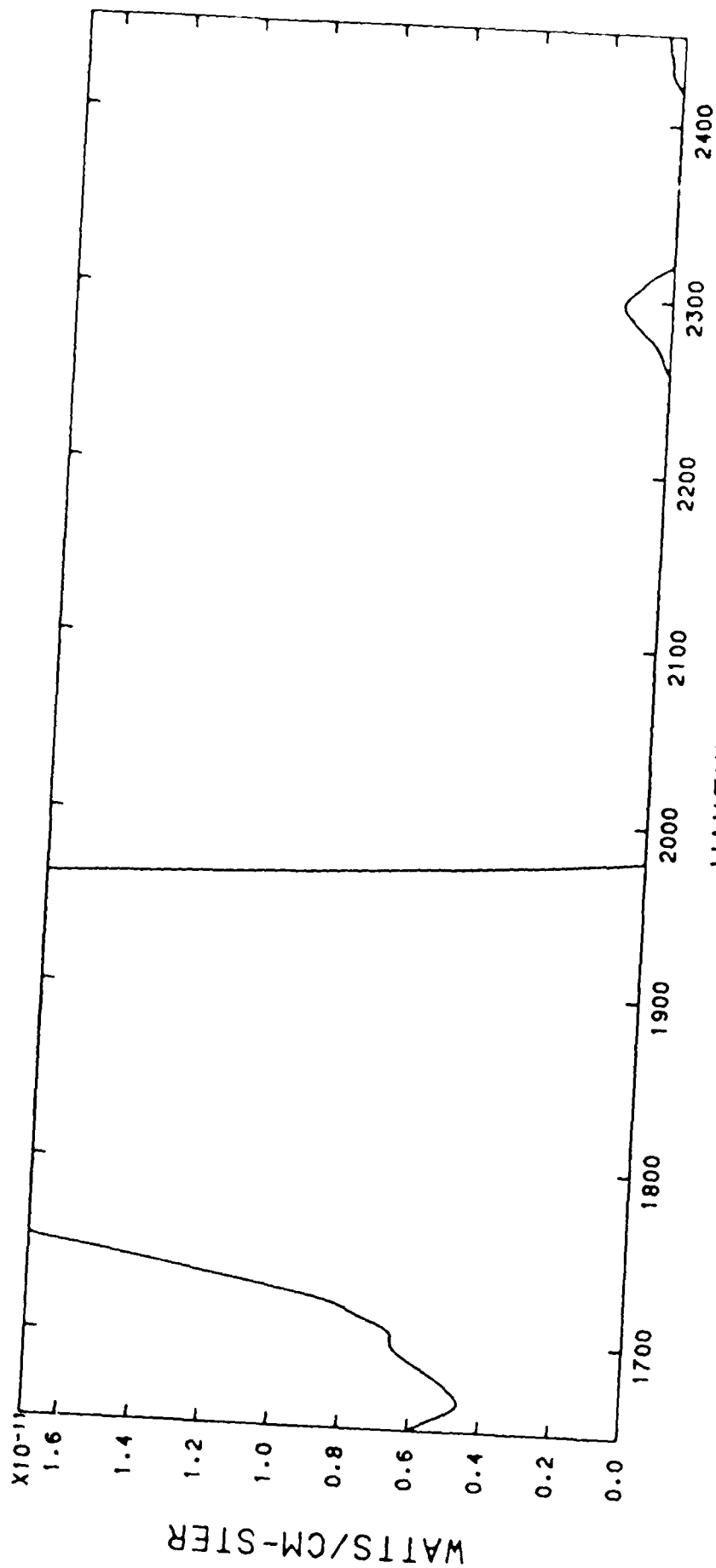
FILE 37, TIME 9: 8:42. 50, ALT 128.4-128.6 KM

30-MAY-83 09:22





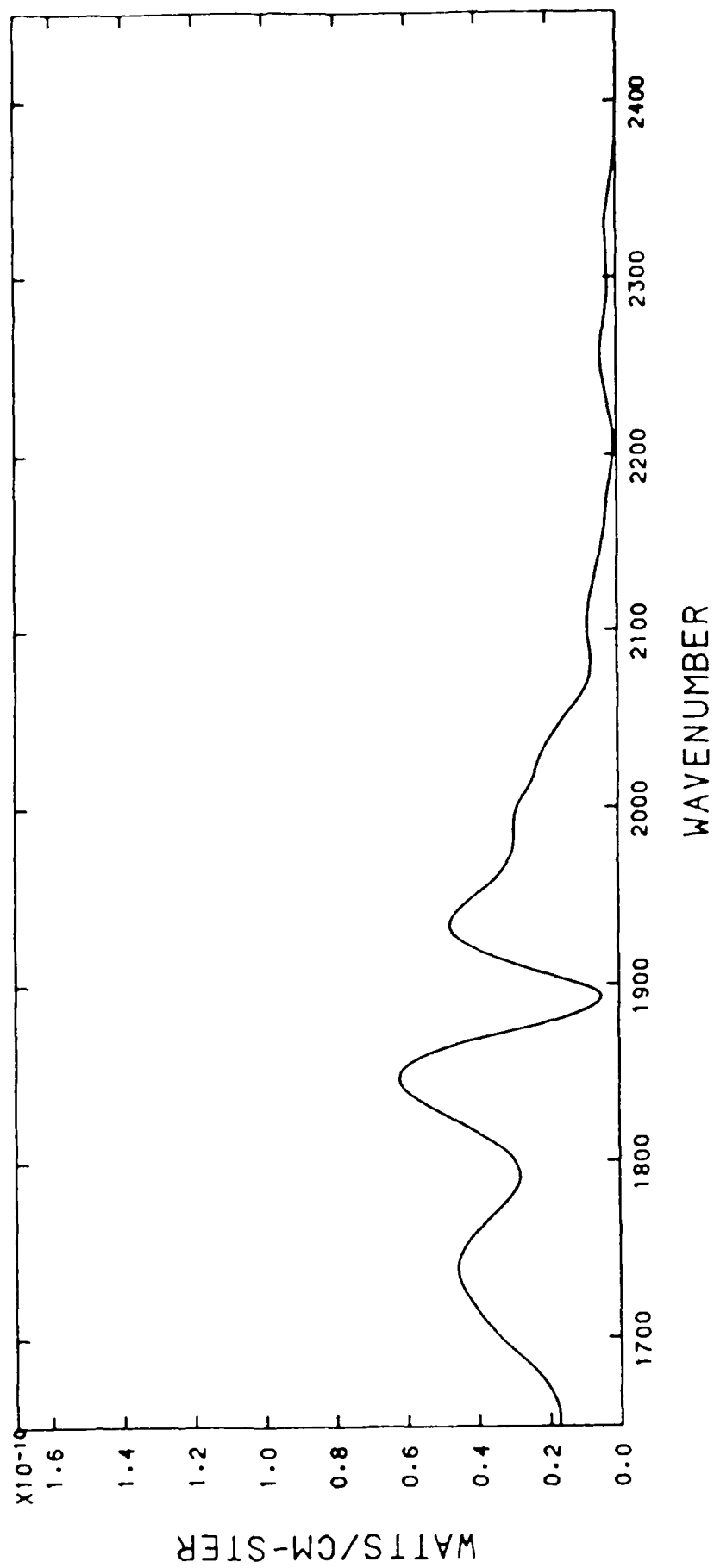
FILE 38. TIME 9: 8:44.810. ALT 129.6-129.8 KM



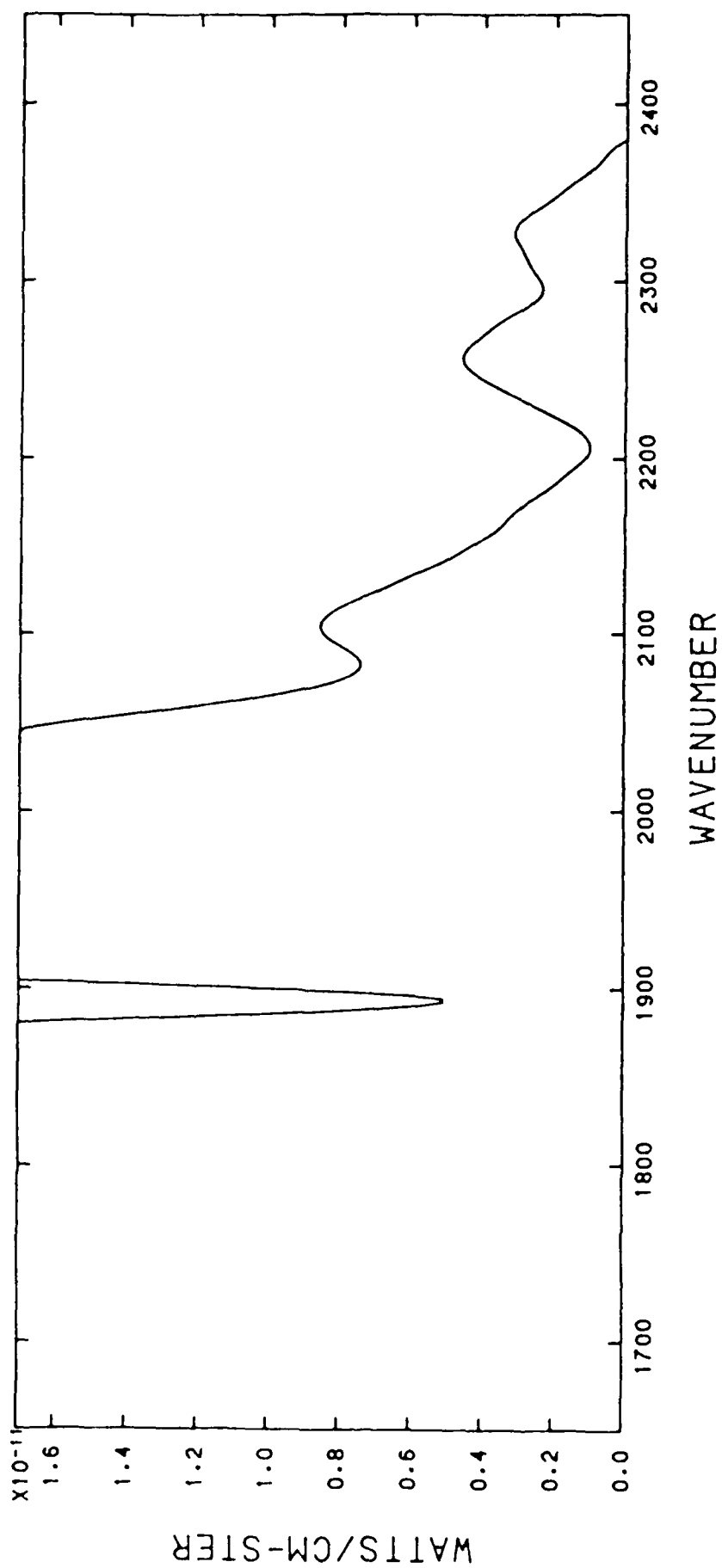
WAVENUMBER

FILE 38, TIME 9: 8:44.810, ALT 129.6-129.8 KM

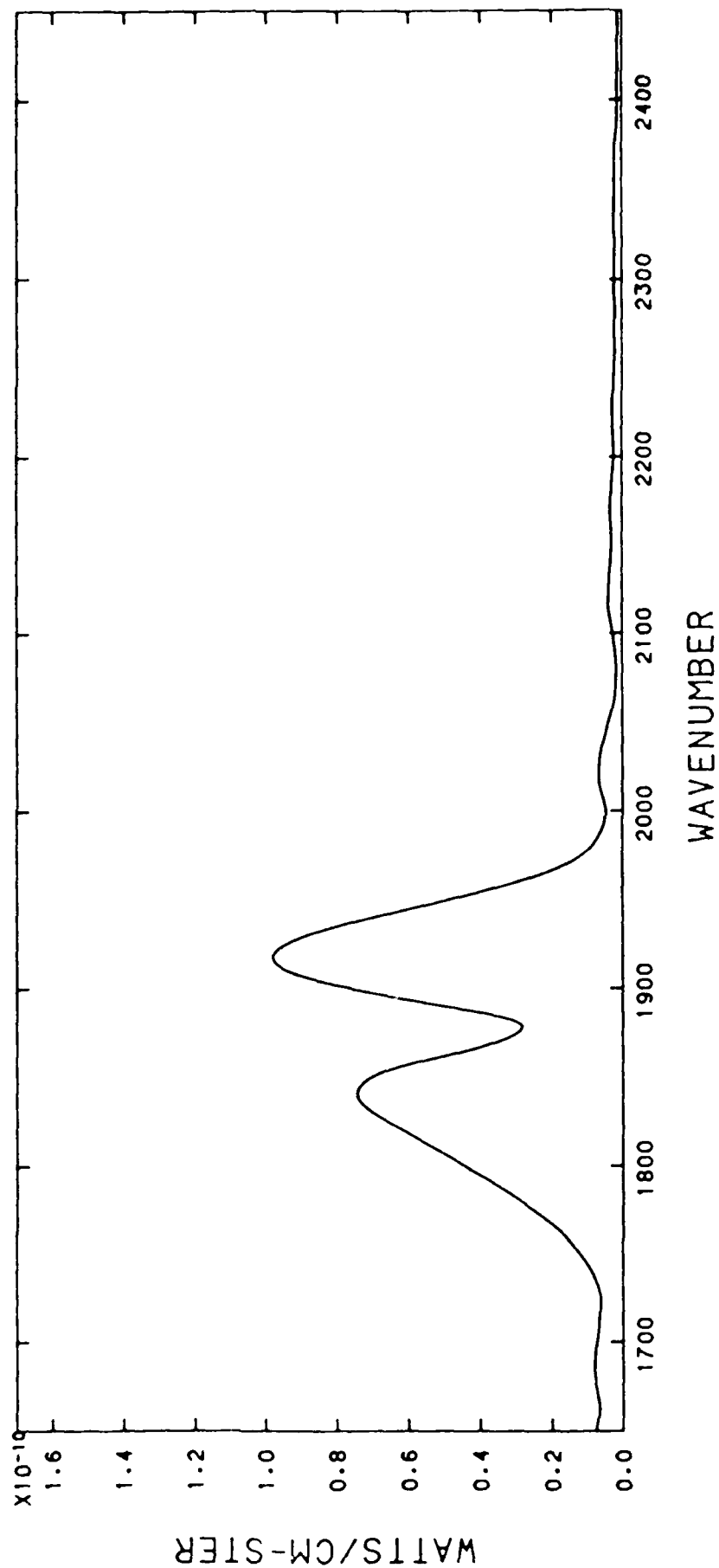
30-NOV-83 09:22



FILE 39, TIME 9: 8:45.306, ALT 129.8-130.0 KM

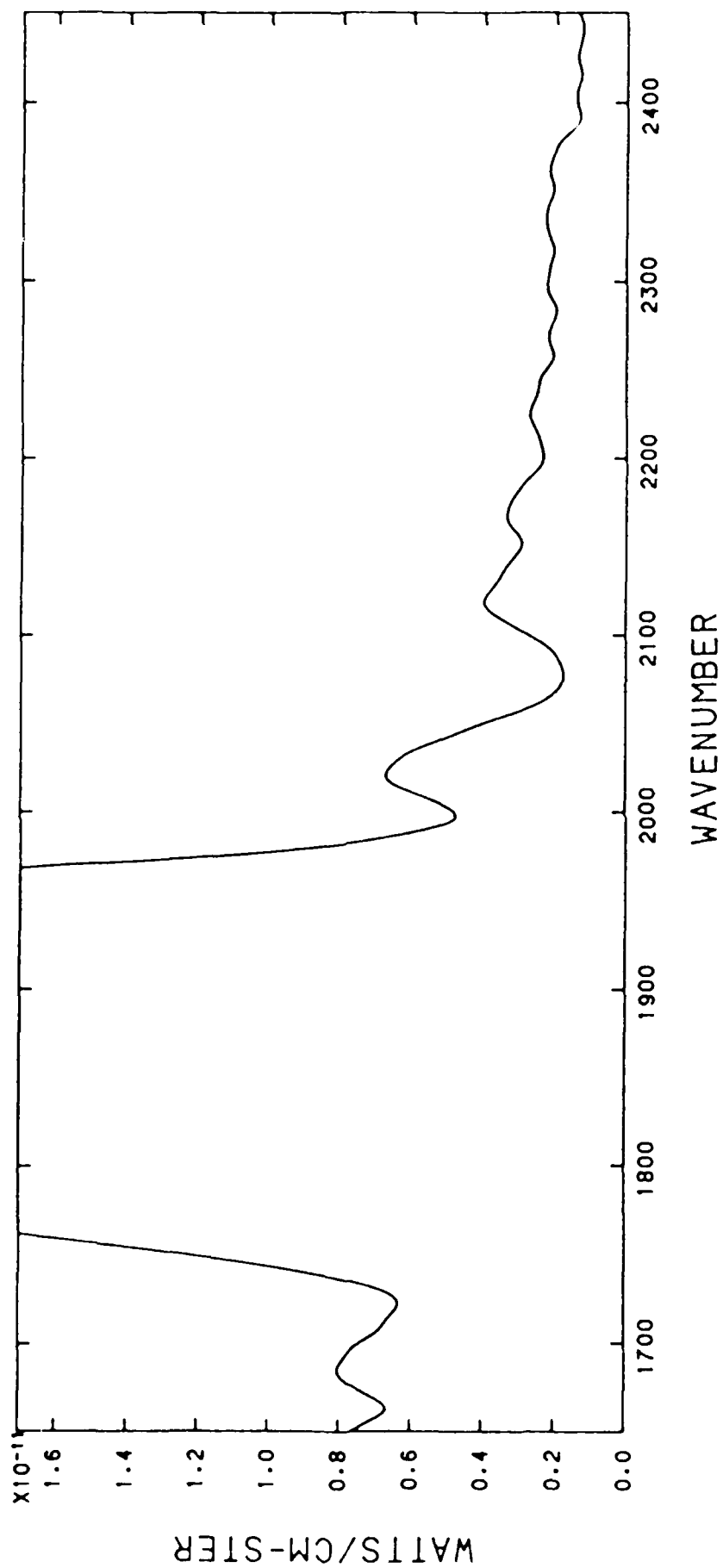


FILE 39, TIME 9: 8:45.306, ALT 129.8-130.0 KM

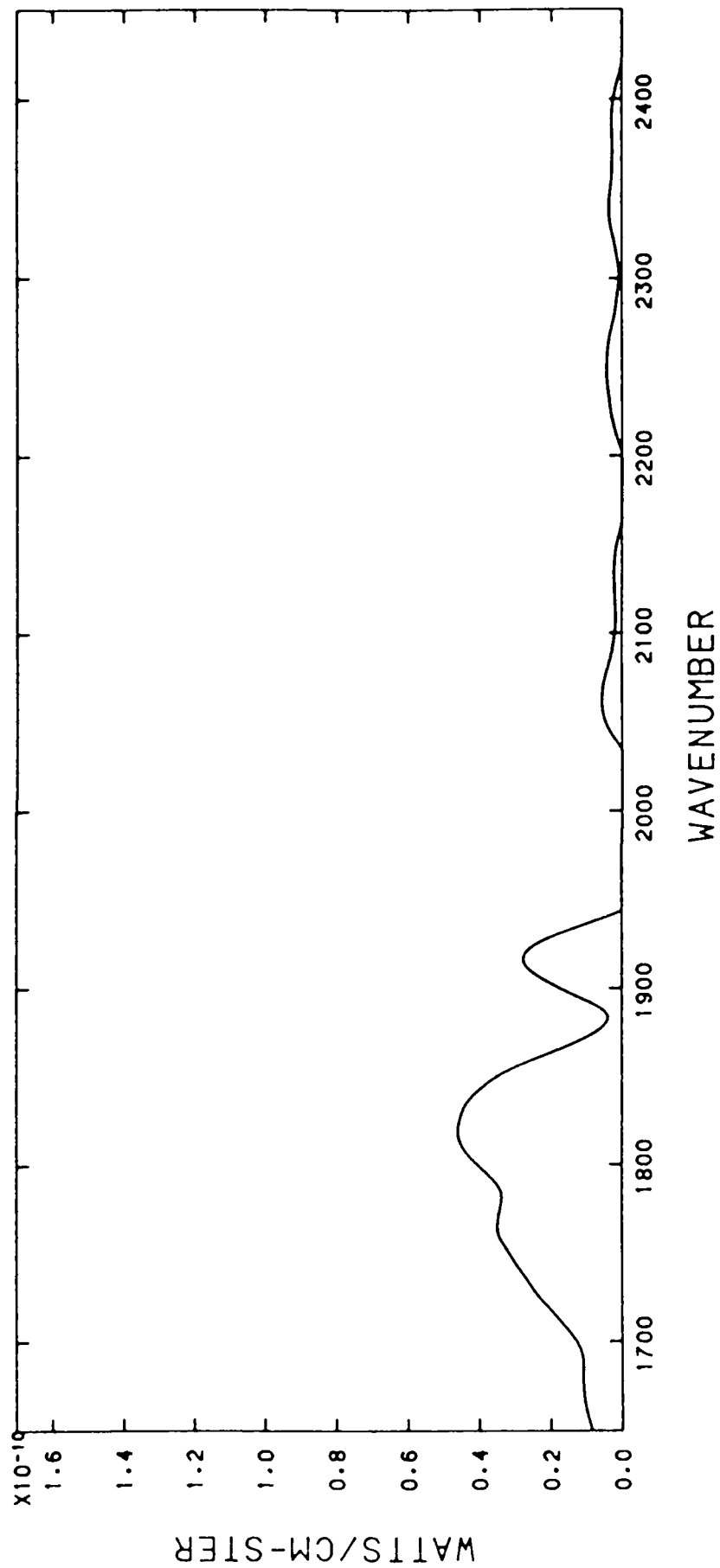


FILE 40, TIME 9: 8:48. 72, ALT 131.0-131.1 KM

30-NOV-83 09:23

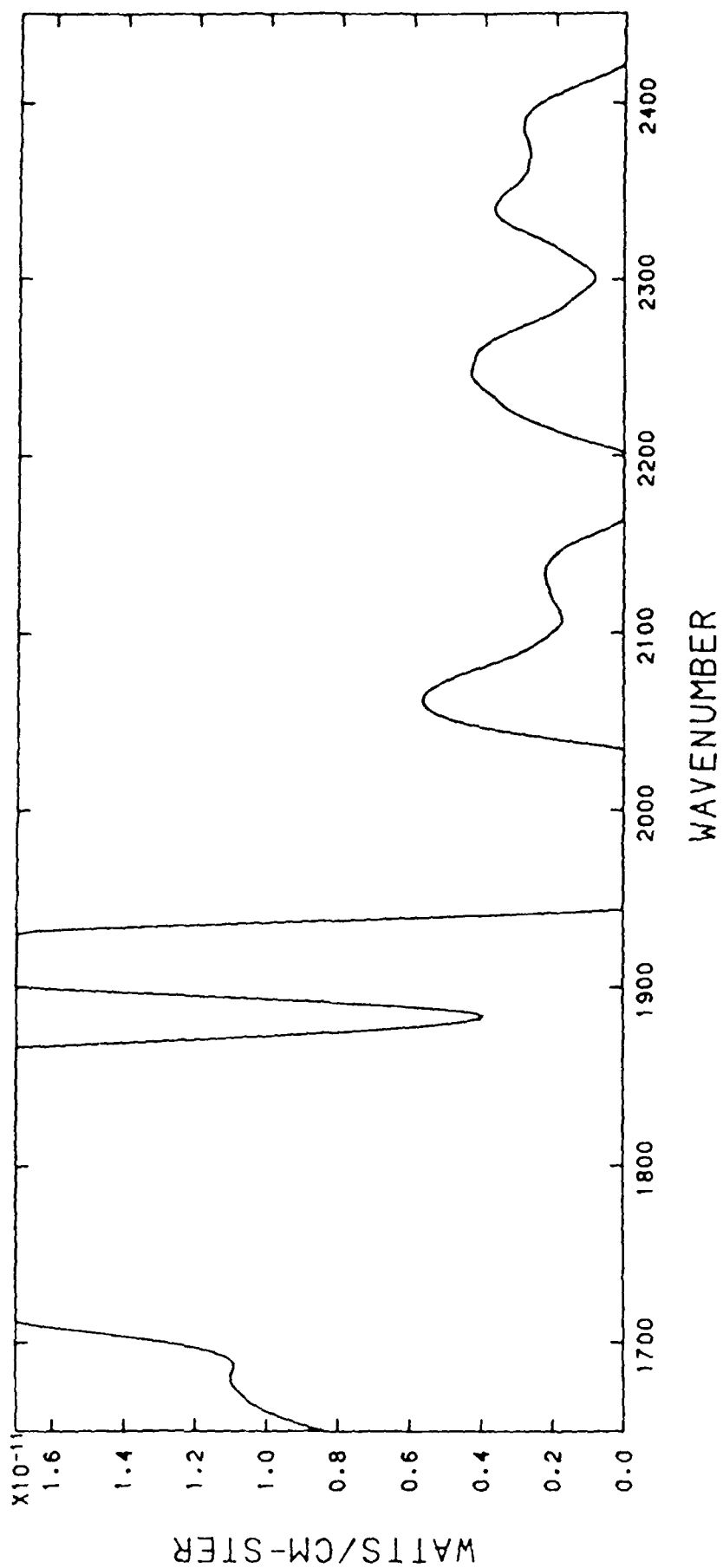


FILE 40. TIME 9: 8:48. 72, ALT 131.0-131.1 KM



FILE 41, TIME 9: 8:48.572, ALT 131.2-131.3 KM

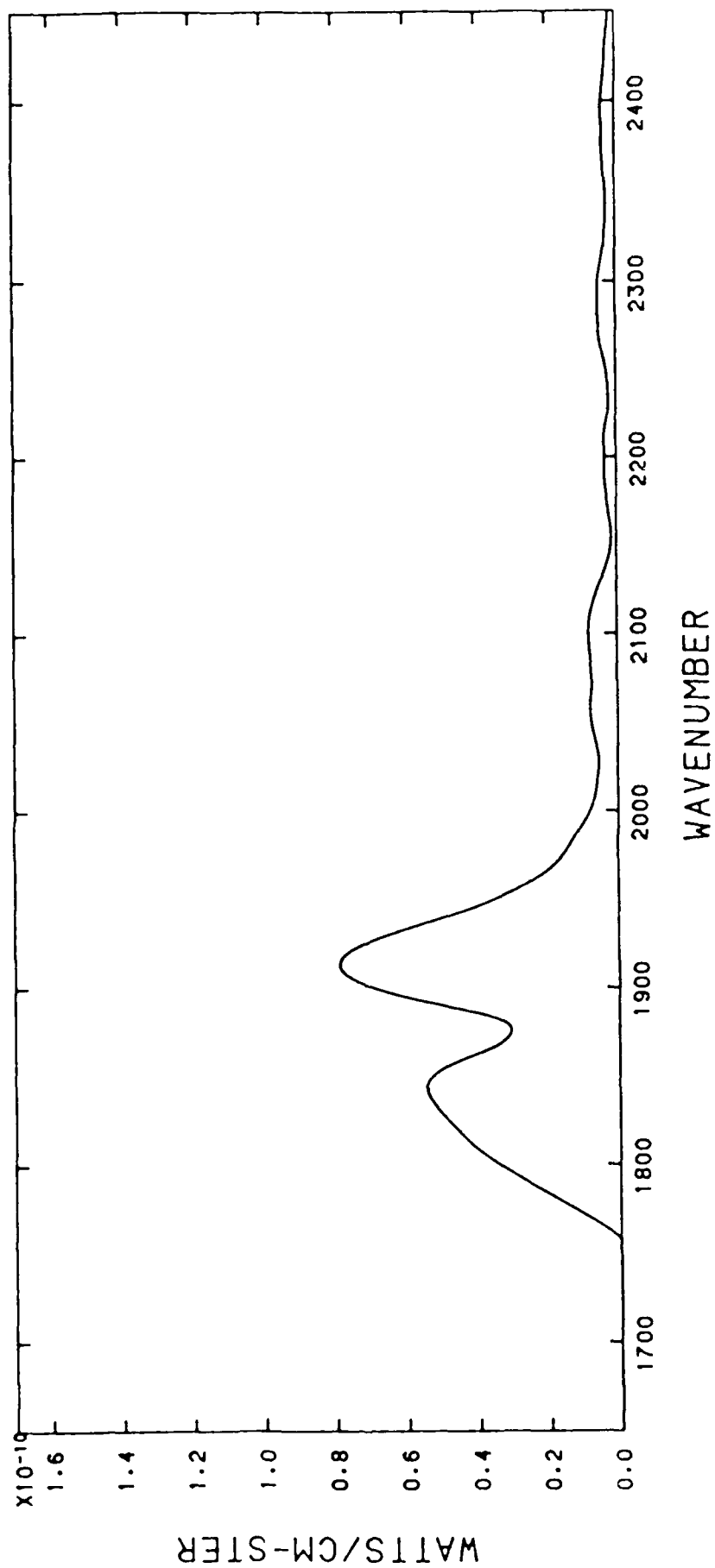
30-MAY-83 09:23



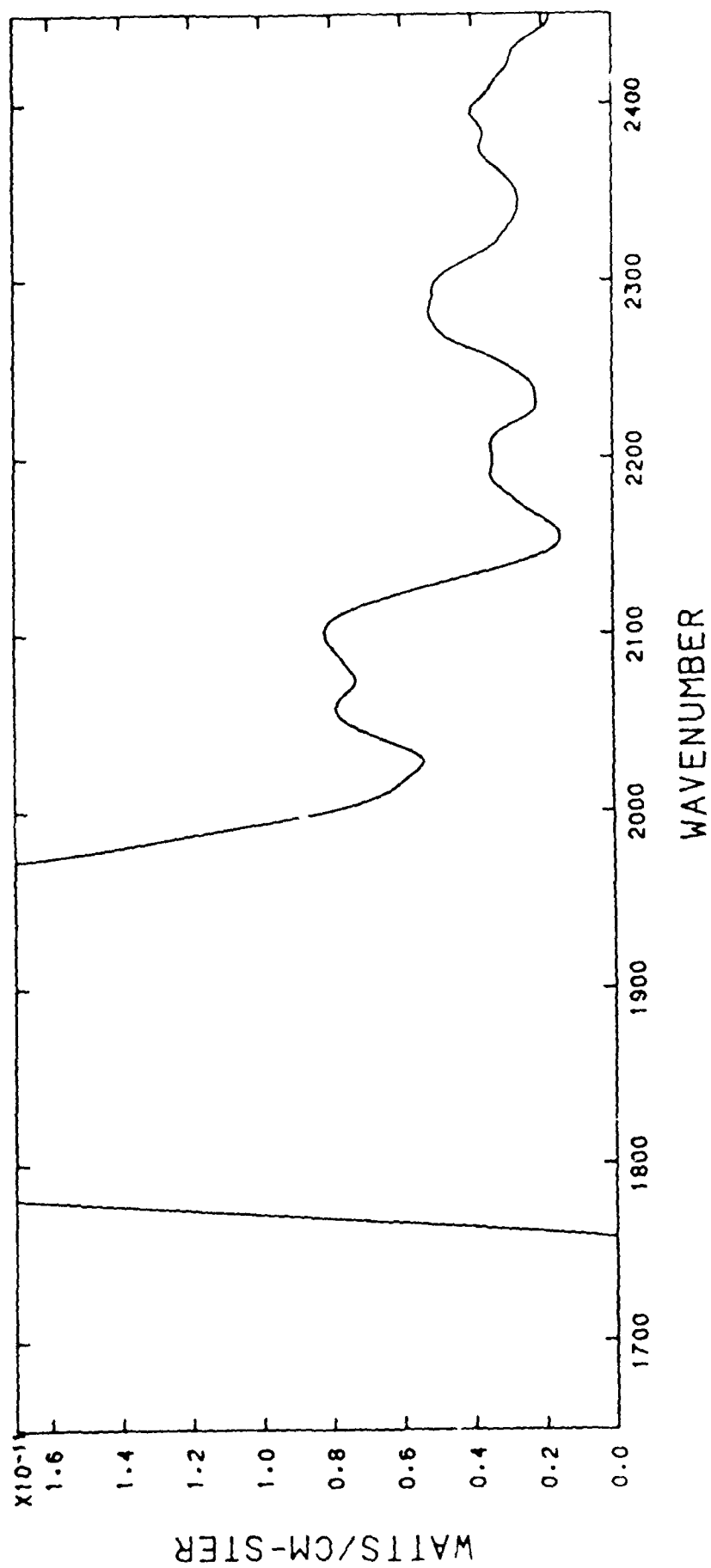
FILE 41, TIME 9: 8:48.572, ALT 131.2-131.3 KM

30-NOV-83 09:23





FILE 42, TIME 9: 8:51.344, ALT 132.2-132.3 KM



FILE 42, TIME 9: 8:51.344, ALT 132.2-132.3 KM

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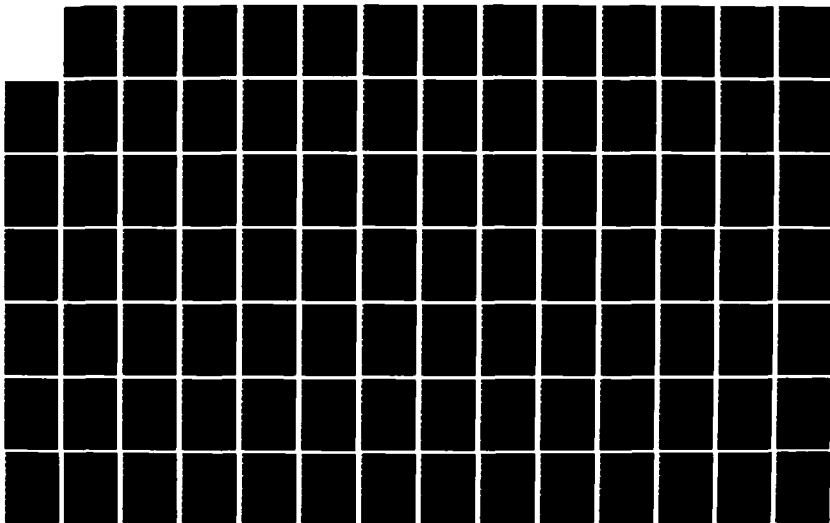
CATALOG OF LOW RESOLUTION INFRARED SPECTRA:  
FIELD-WIDENED INTERFEROMETER (U) UTAH STATE UNIV LOGAN  
SPACE DYNAMICS LABS R W HAYCOCK ET AL 26 JUN 85

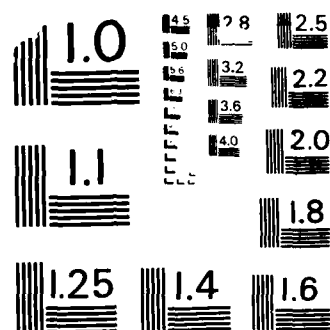
2/4

UNCLASSIFIED

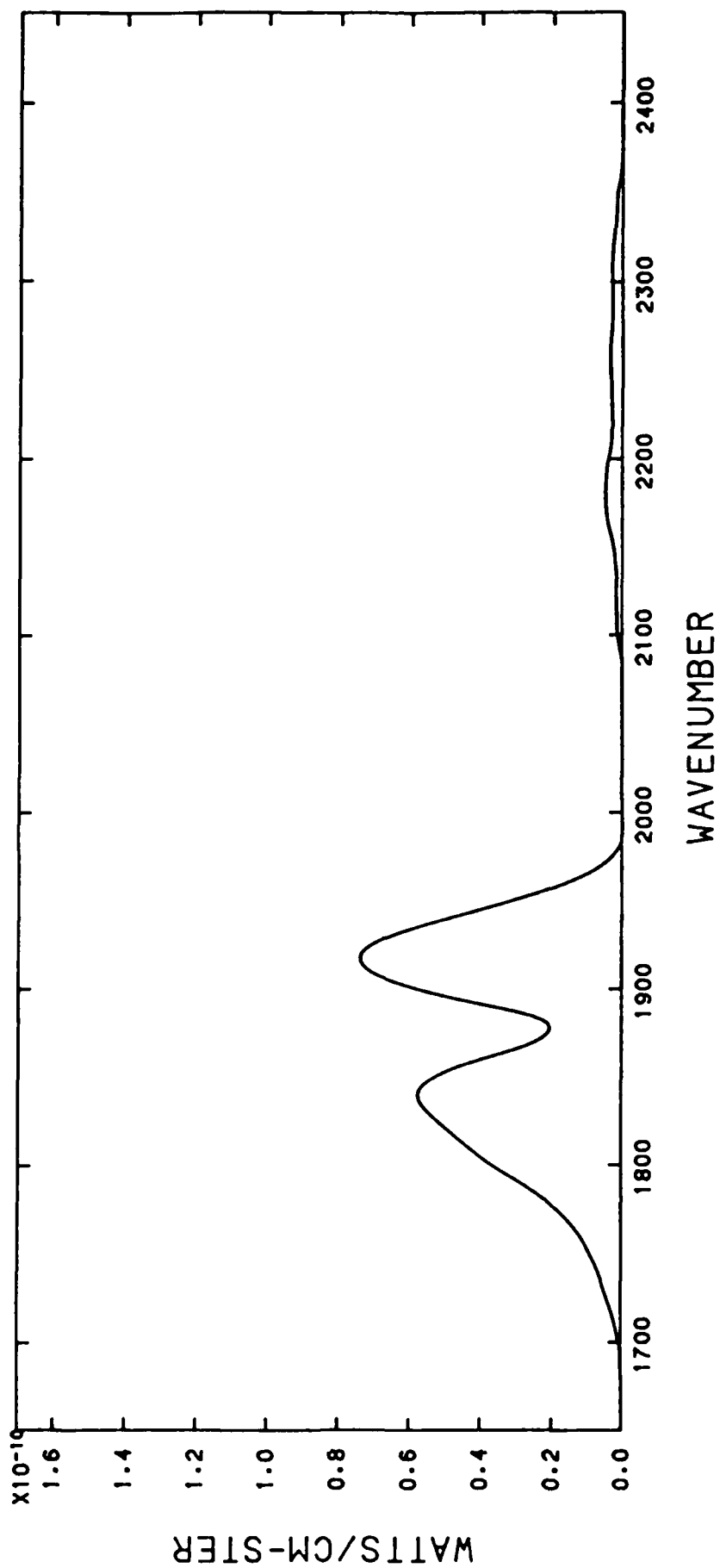
SDL/85-046 AFGL-TR-85-0162 F19628-83-C-0056 F/G 20/6

NL



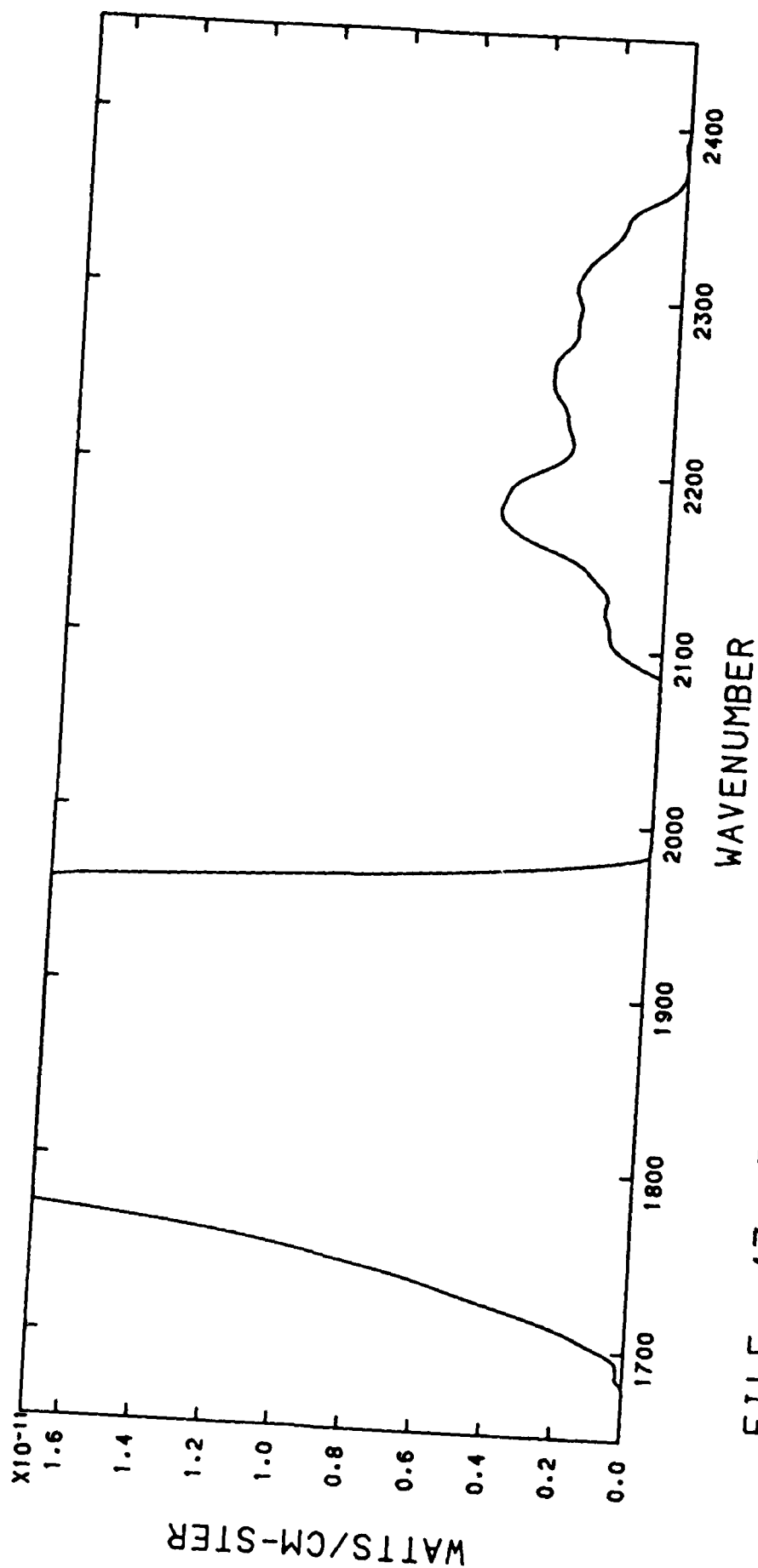


MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

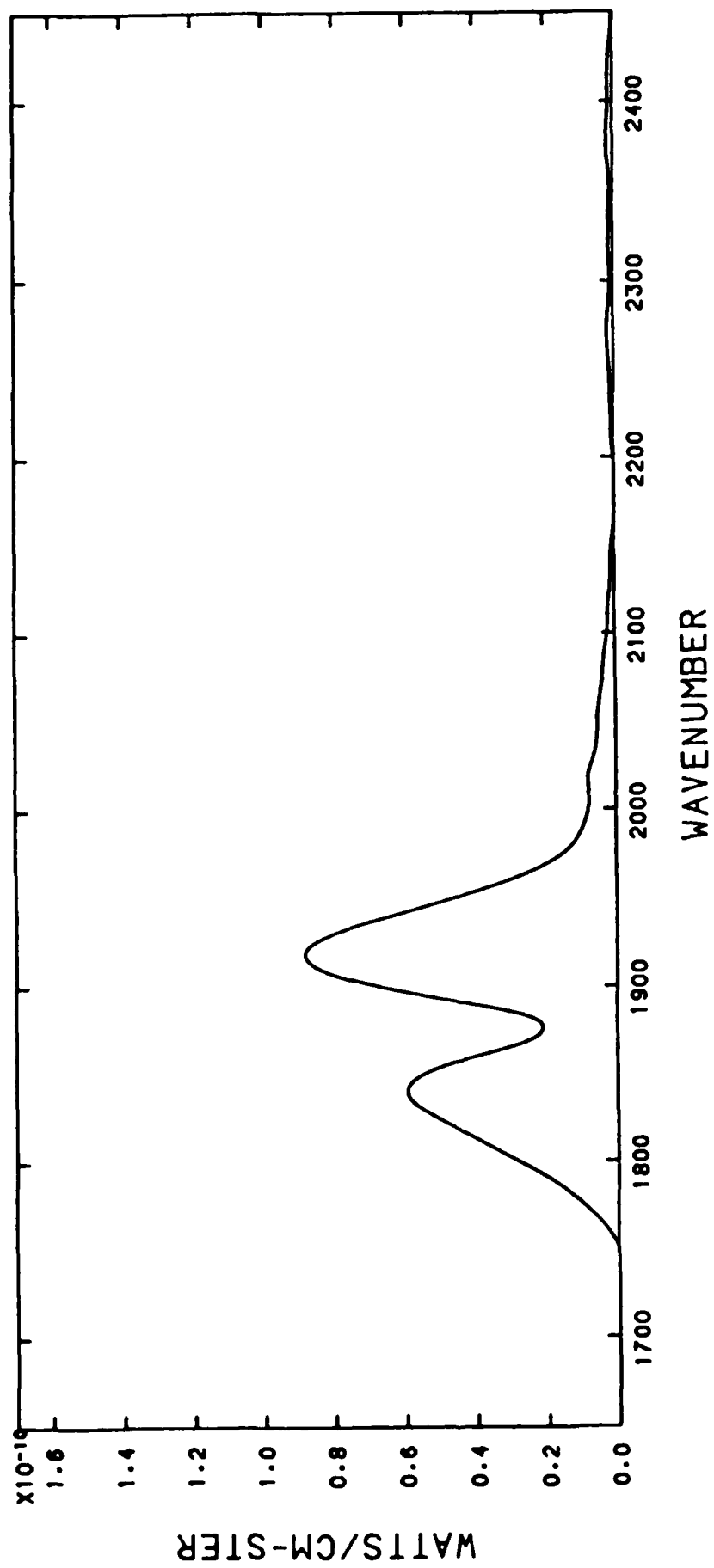


FILE 43, TIME 9: 8:51.840, ALT 132.4-132.5 KM

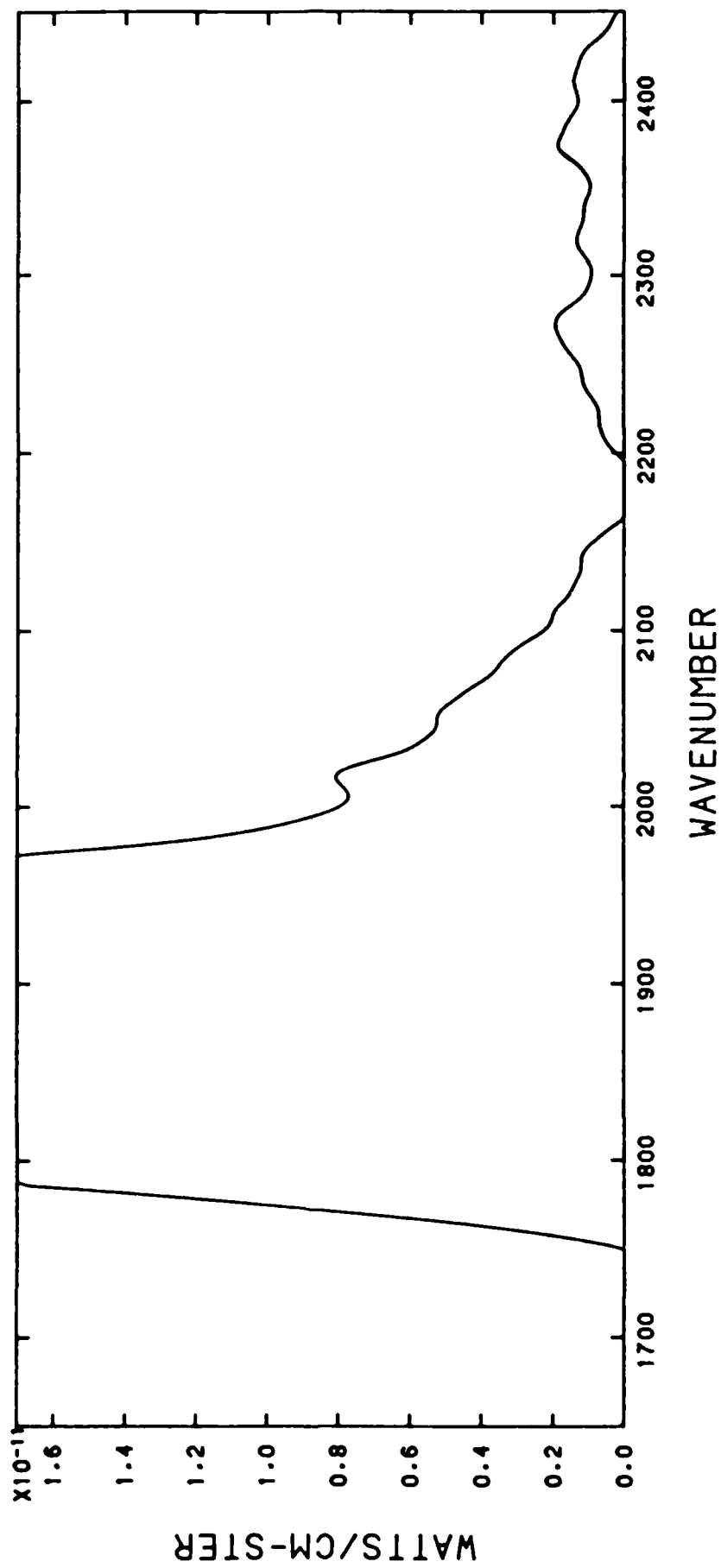
30-NOV-83 09:23



FILE 43, TIME 9: 8:51.840, ALT 132.4-132.5 KM

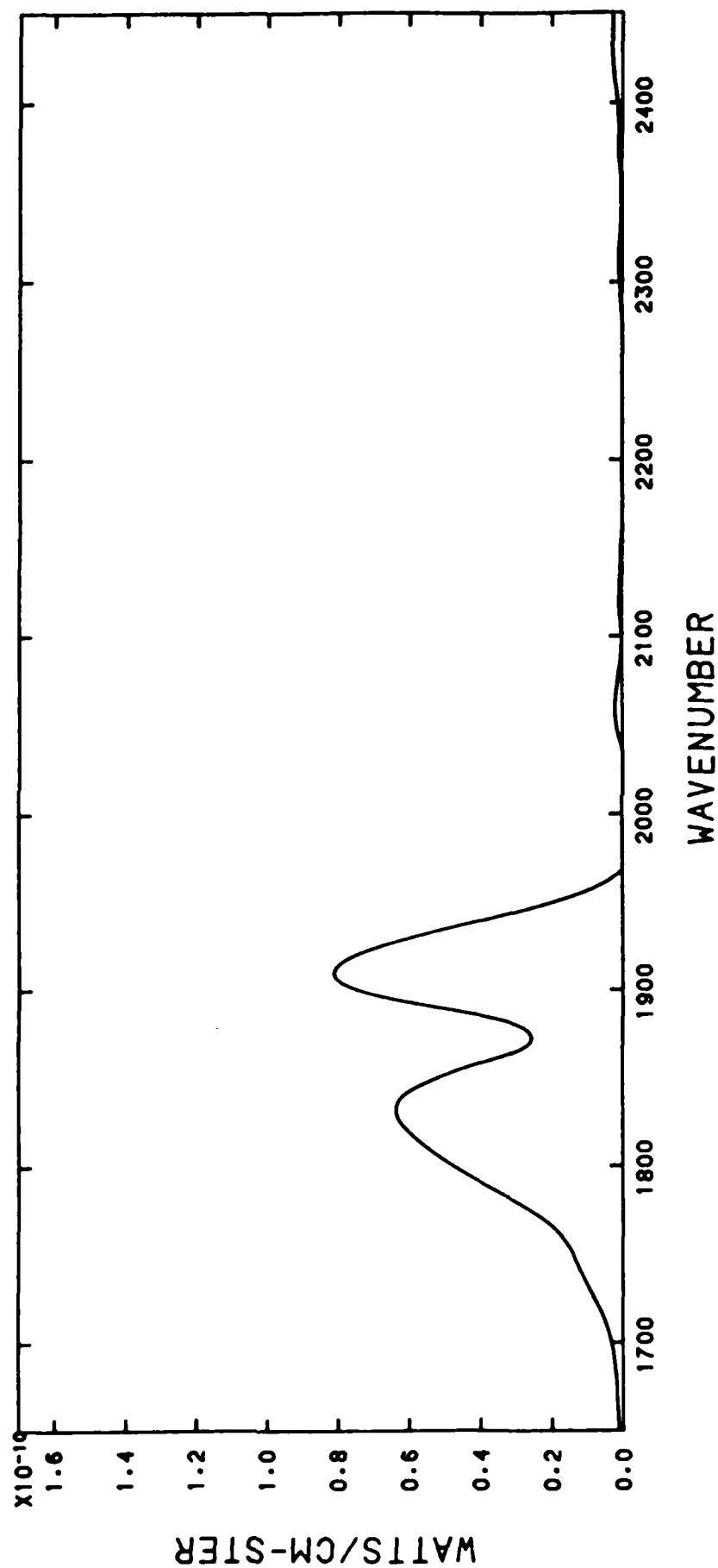


FILE 44, TIME 9: 8:54.606, ALT 133.3-133.5 KM

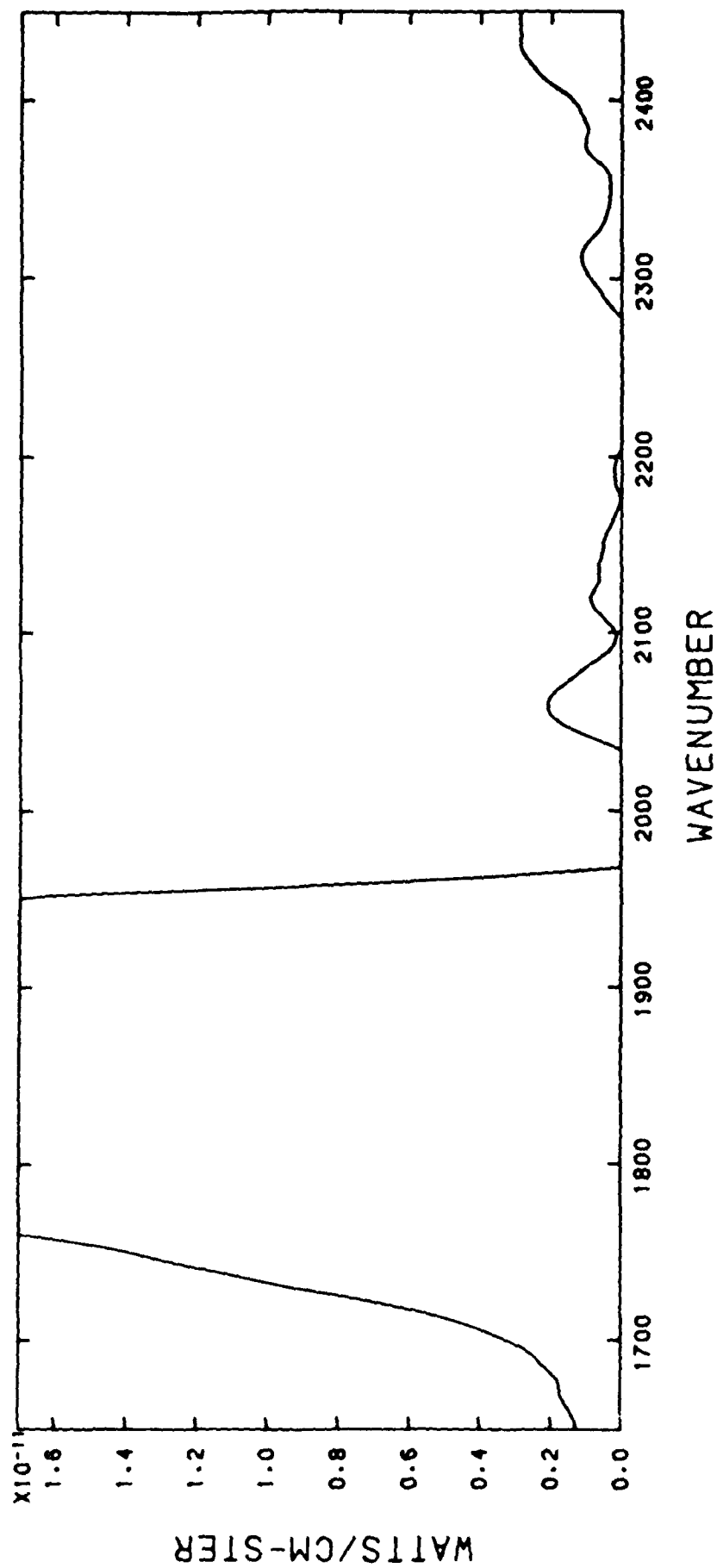


FILE 44, TIME 9: 8:54.606, ALT 133.3-133.5 KM

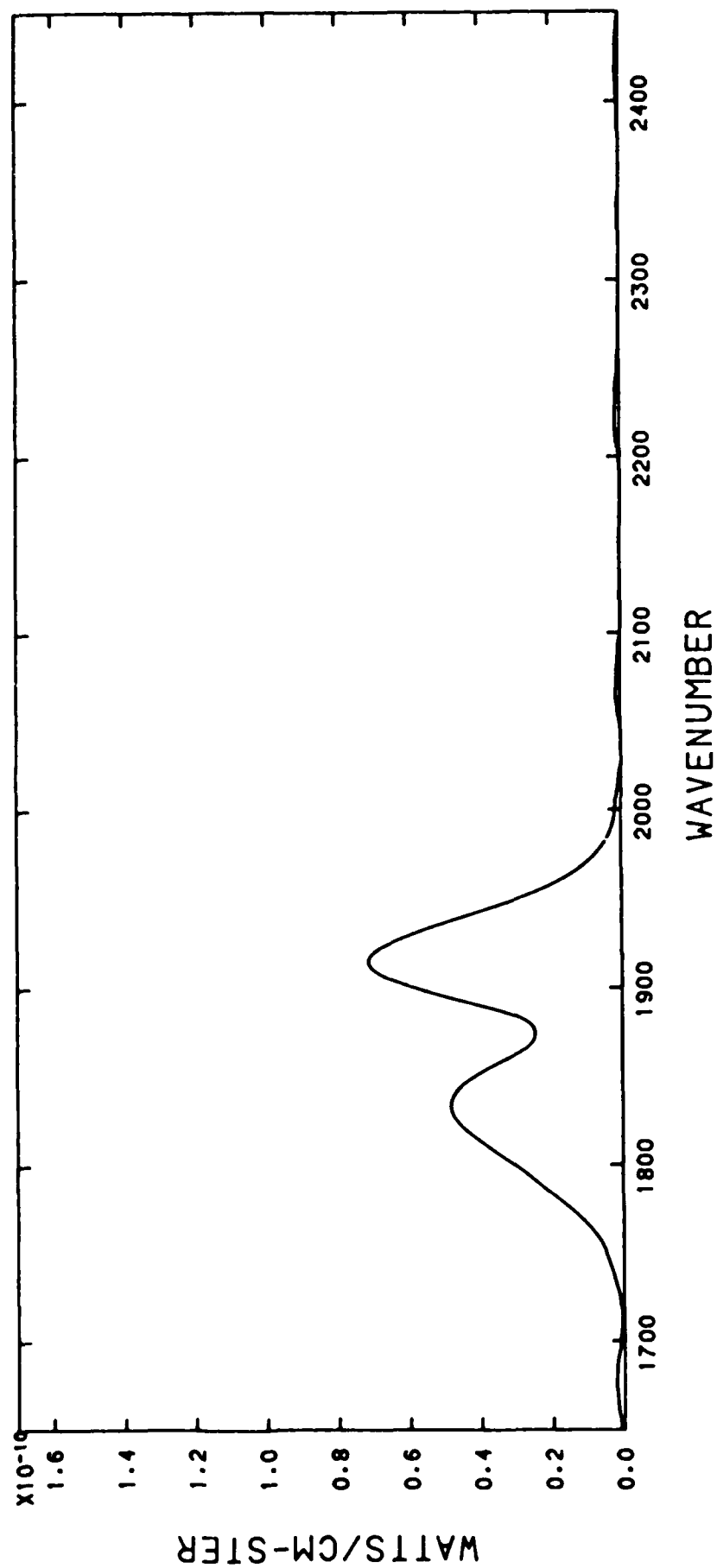




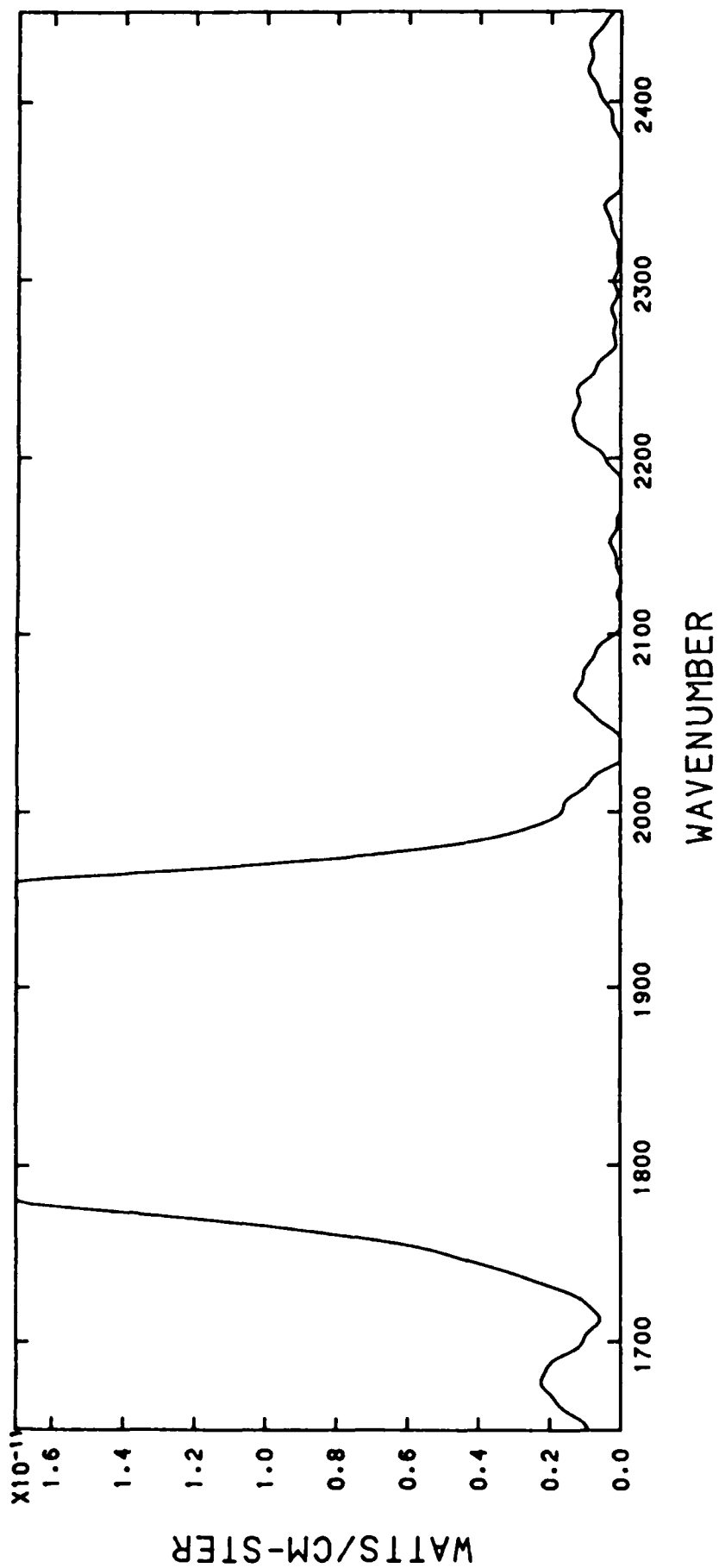
FILE 45, TIME 9: 8:55.102, ALT 133.5-133.6 KM



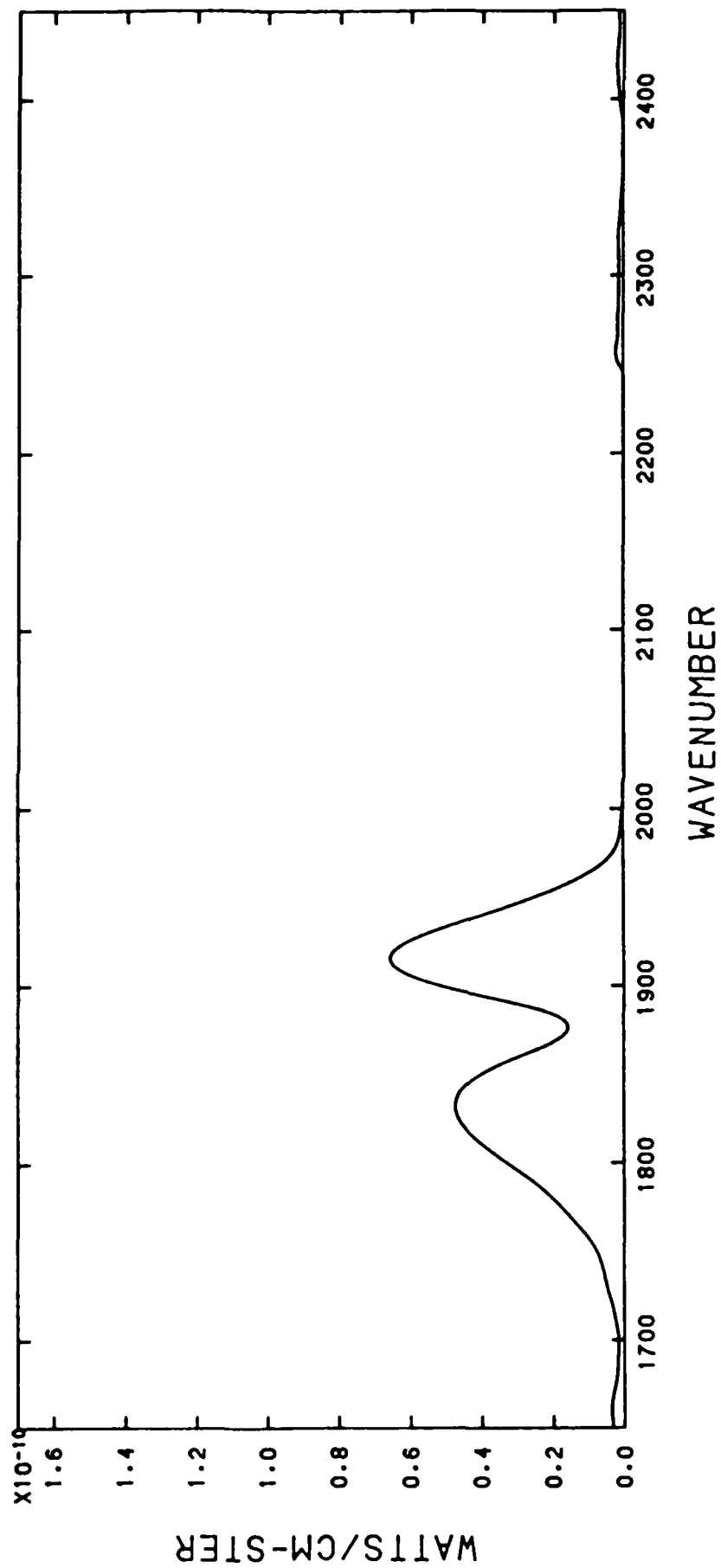
FILE 45, TIME 9: 8:55.102, ALT 133.5-133.6 KM



FILE 46, TIME 9: 8:57.862, ALT 134.4-134.5 KM

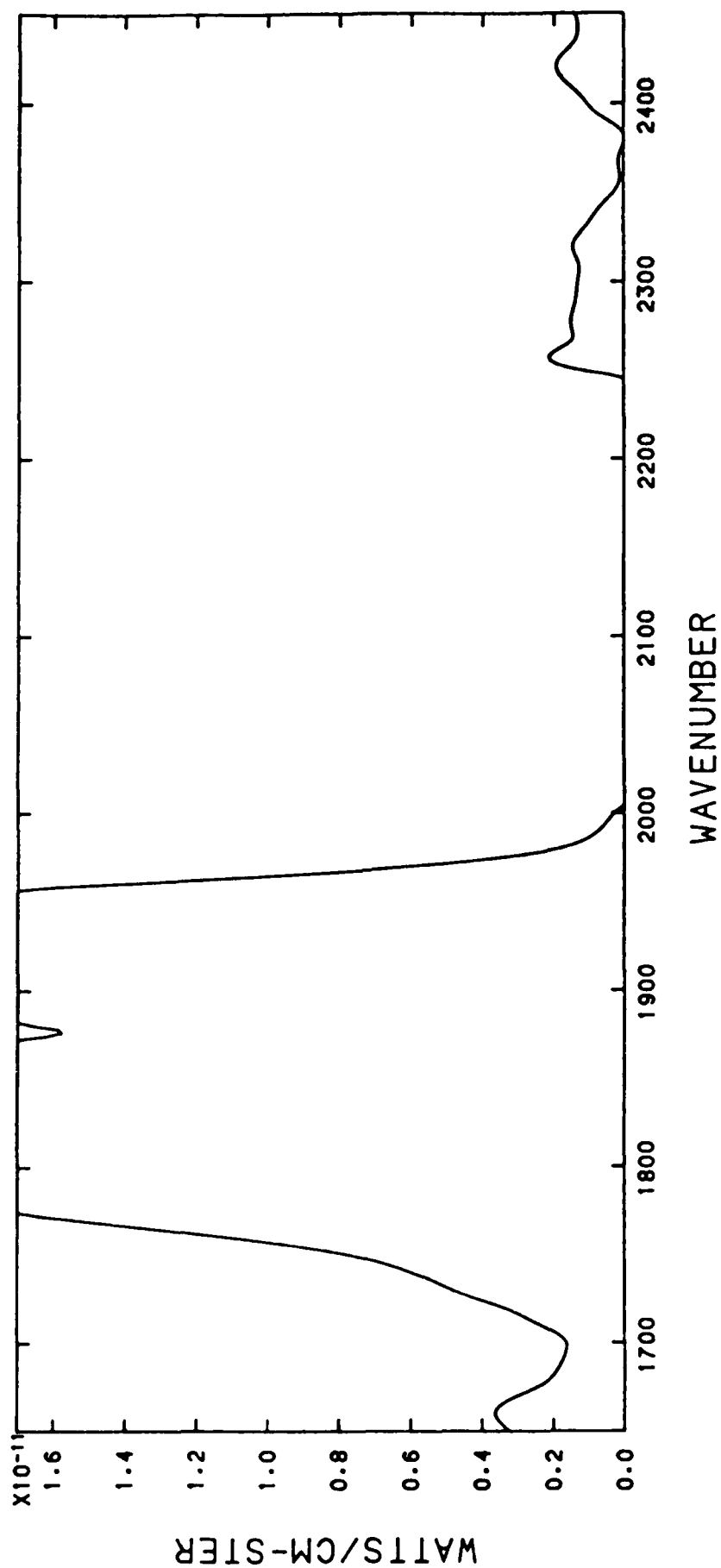


FILE 46, TIME 9: 8:57.862, ALT 134.4-134.5 KM

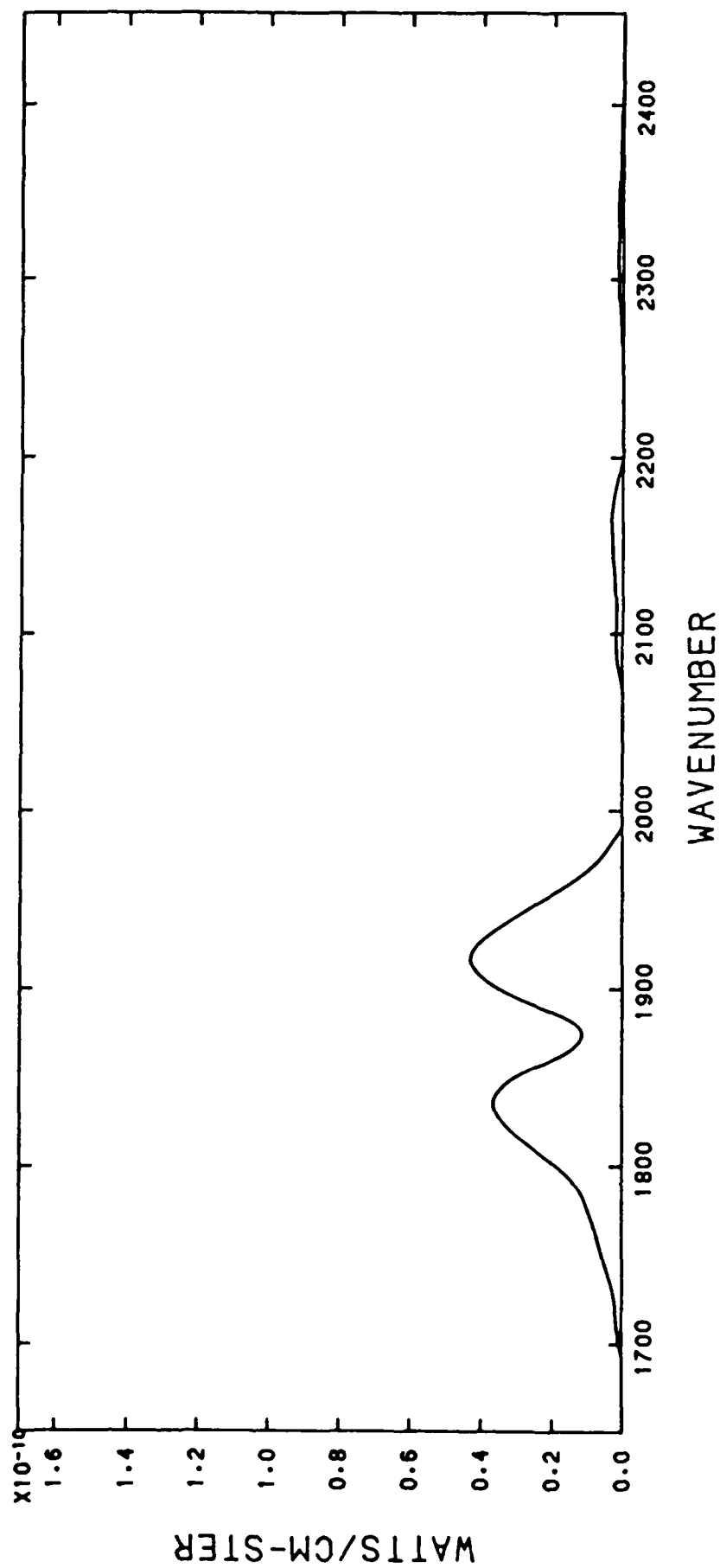


FILE 47, TIME 9: 8:58.360, ALT 134.5-134.6 KM

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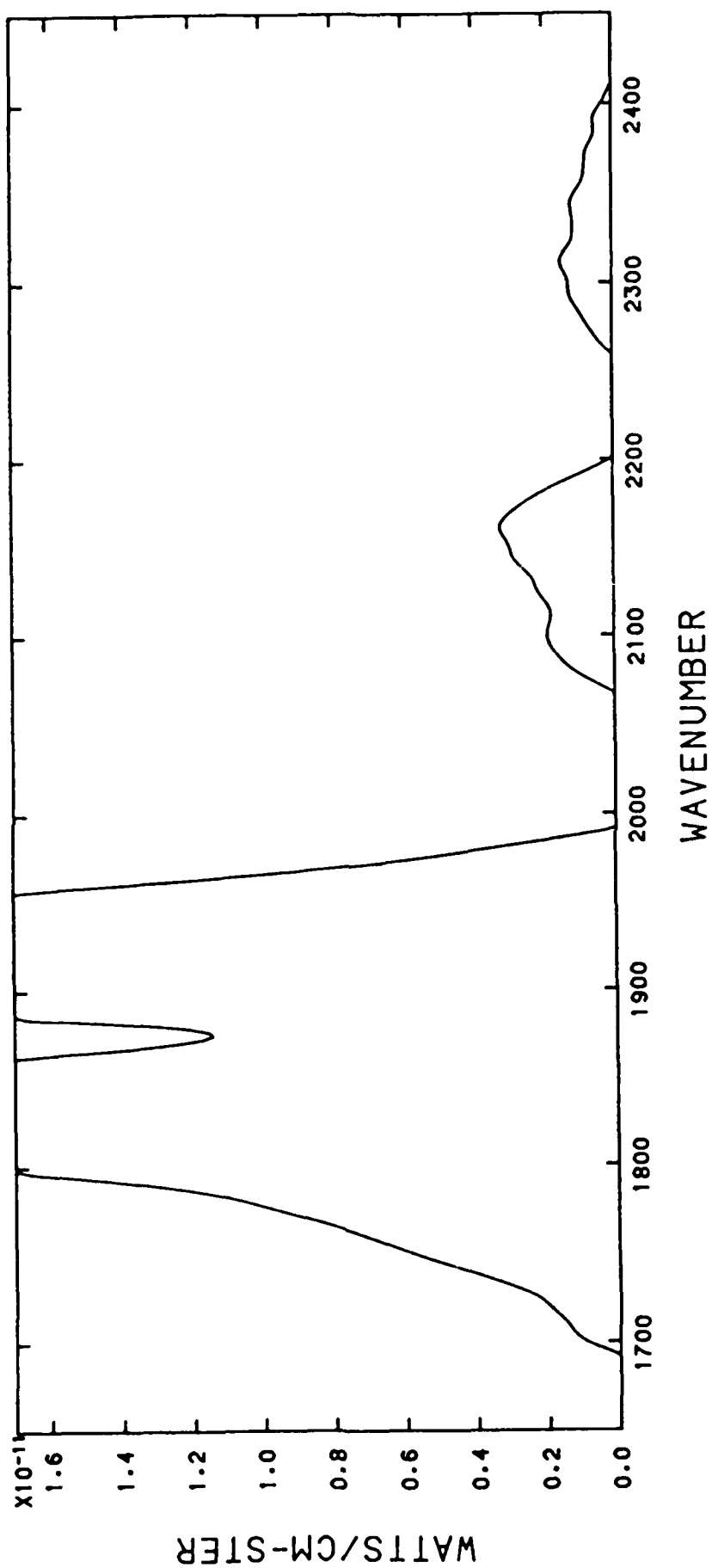


FILE 47, TIME 9: 8:58.360, ALT 134.5-134.6 KM



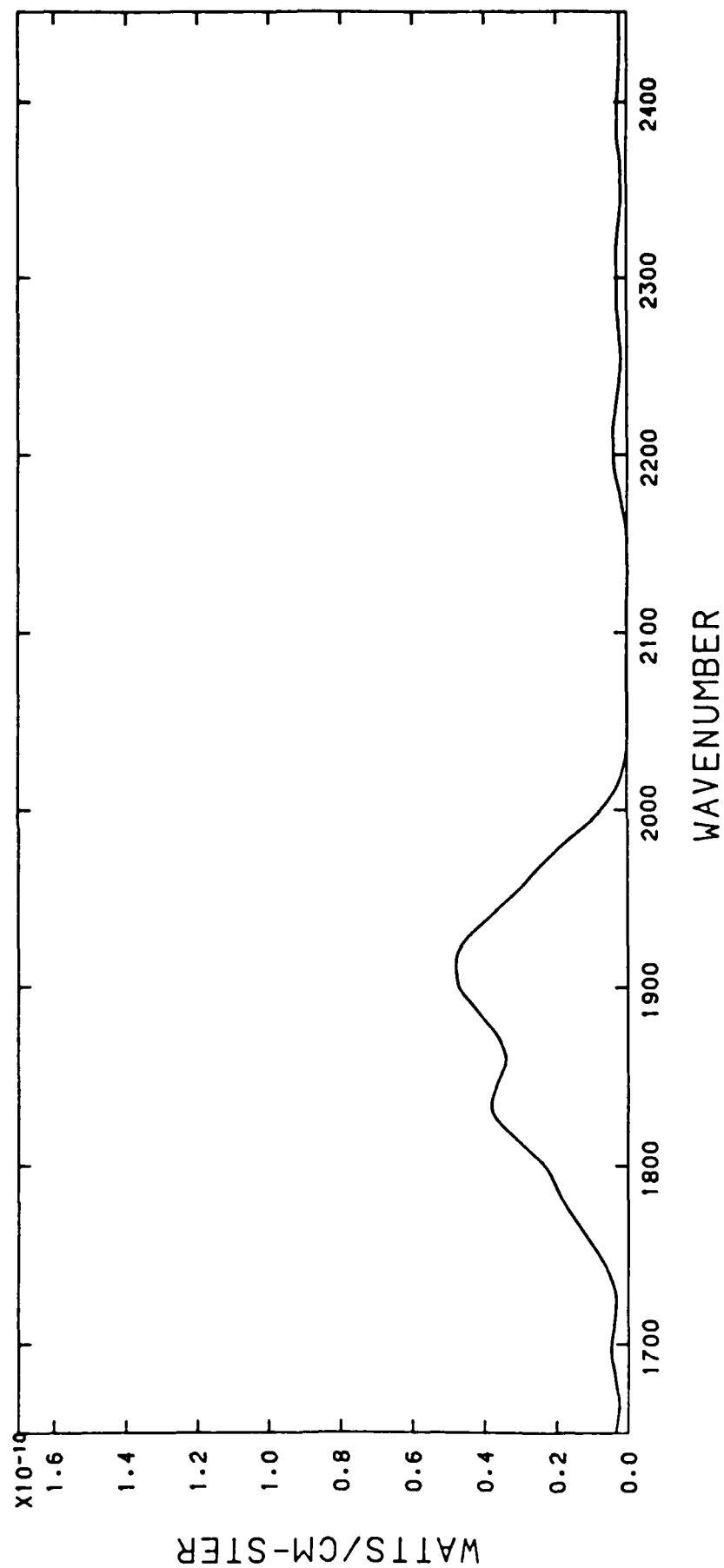
FILE 48, TIME 9: 9: 1.124, ALT 135.3-135.4 KM

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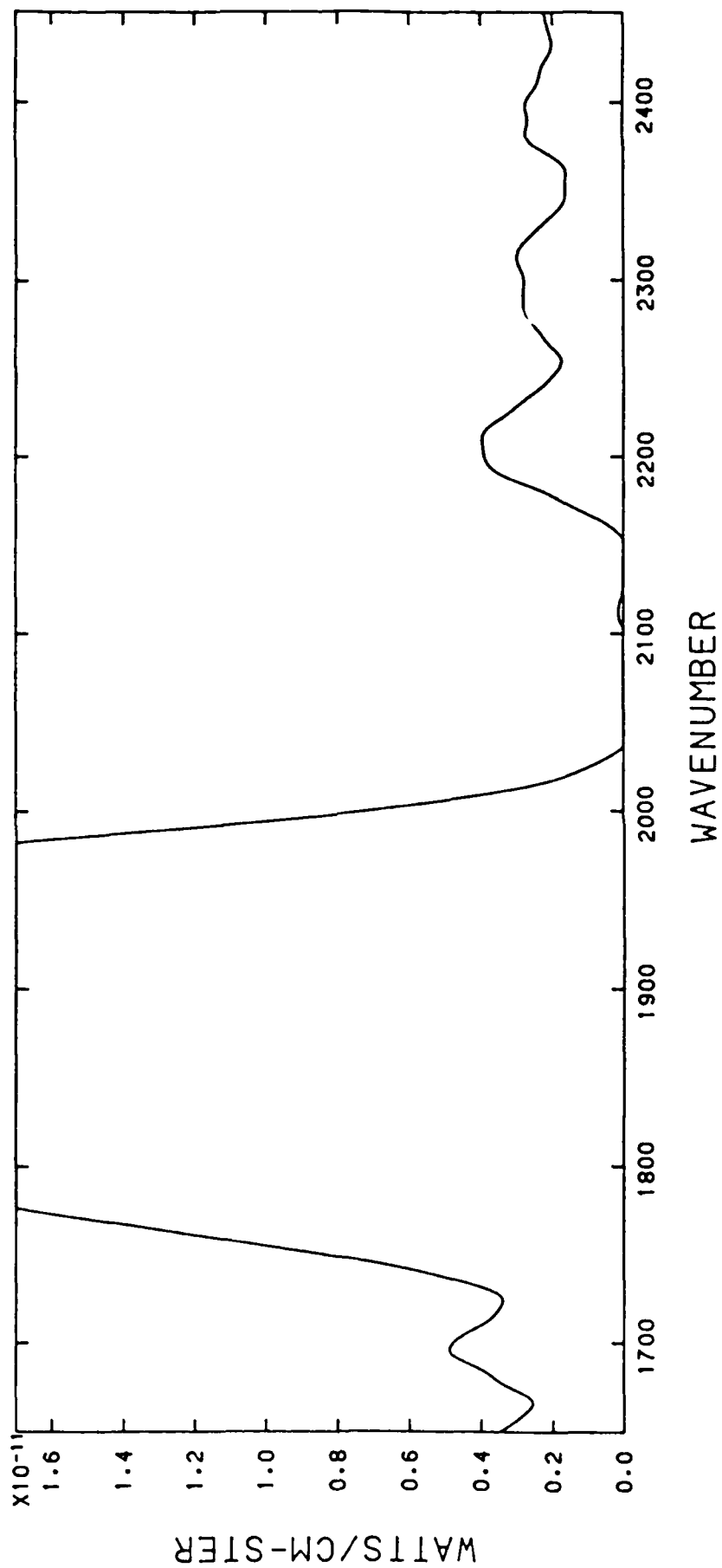
FILE 48, TIME 9: 9: 1.124, ALT 135.3-135.4 KM





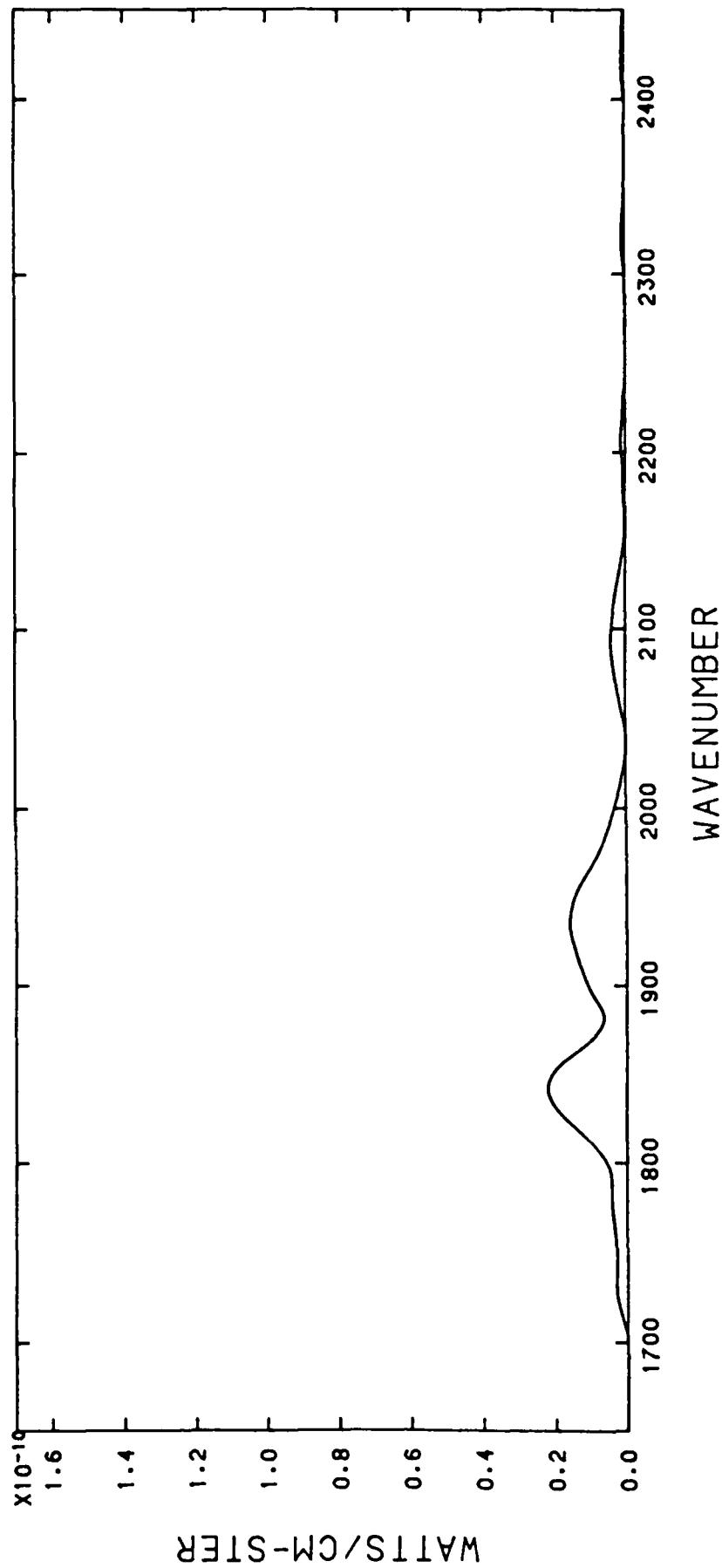
FILE 49, TIME 9: 9: 1.620, ALT 135.5-135.6 KM

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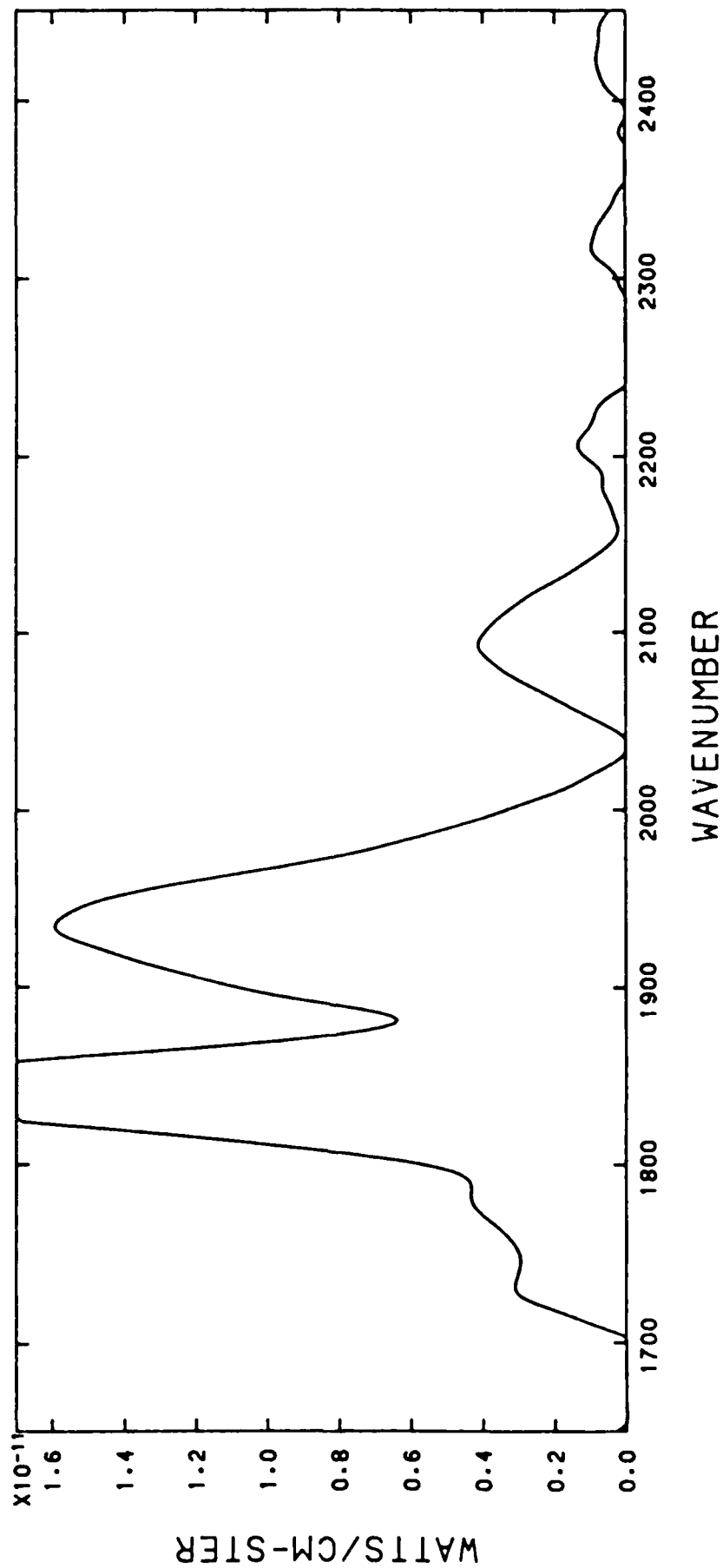
FILE 49, TIME 9: 9: 1.620, ALT 135.5-135.6 KM

30-NOV-83 09:25

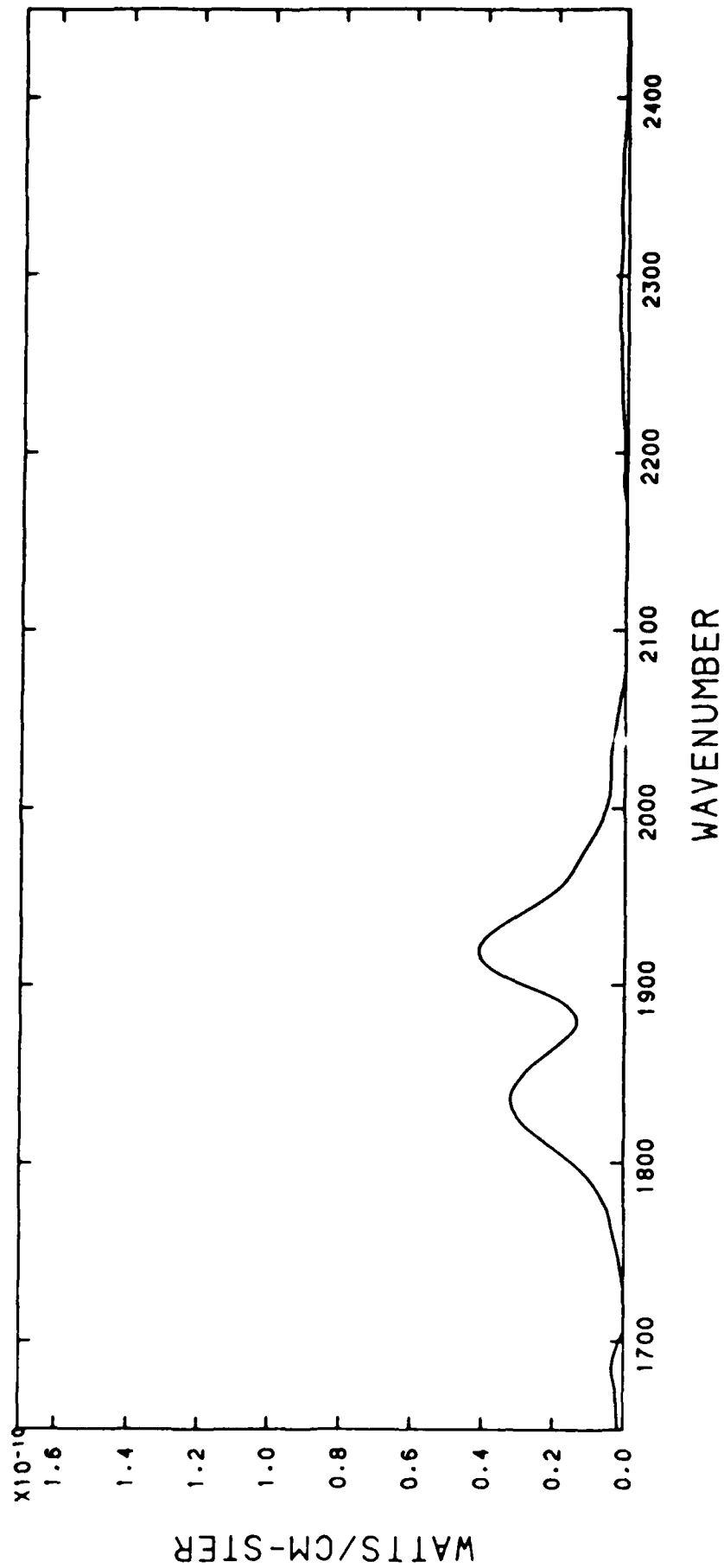


FILE 50, TIME 9: 9: 4.384, ALT 136.2-136.2 KM

30-NOV-83 09:25

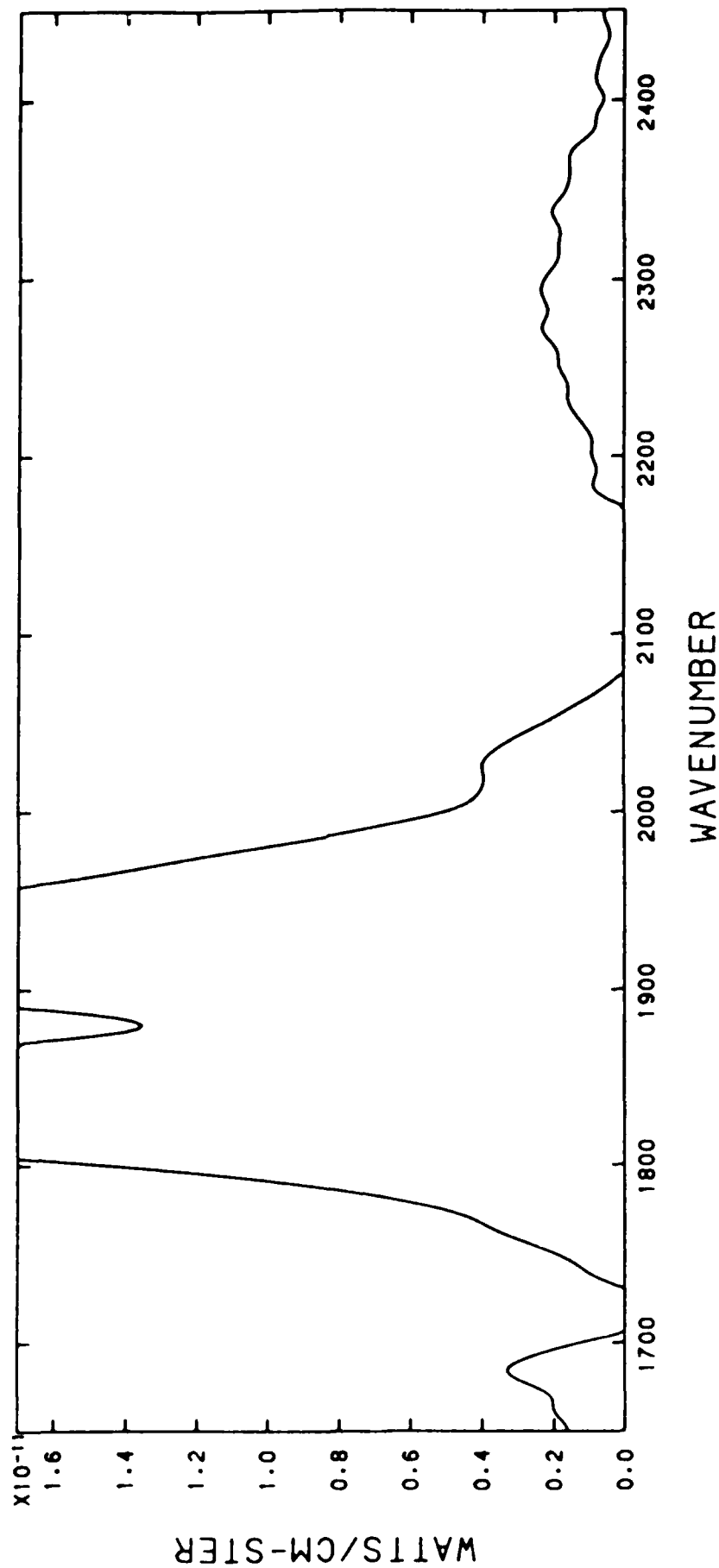


FILE 50, TIME 9: 9: 4.384, ALT 136.2-136.2 KM

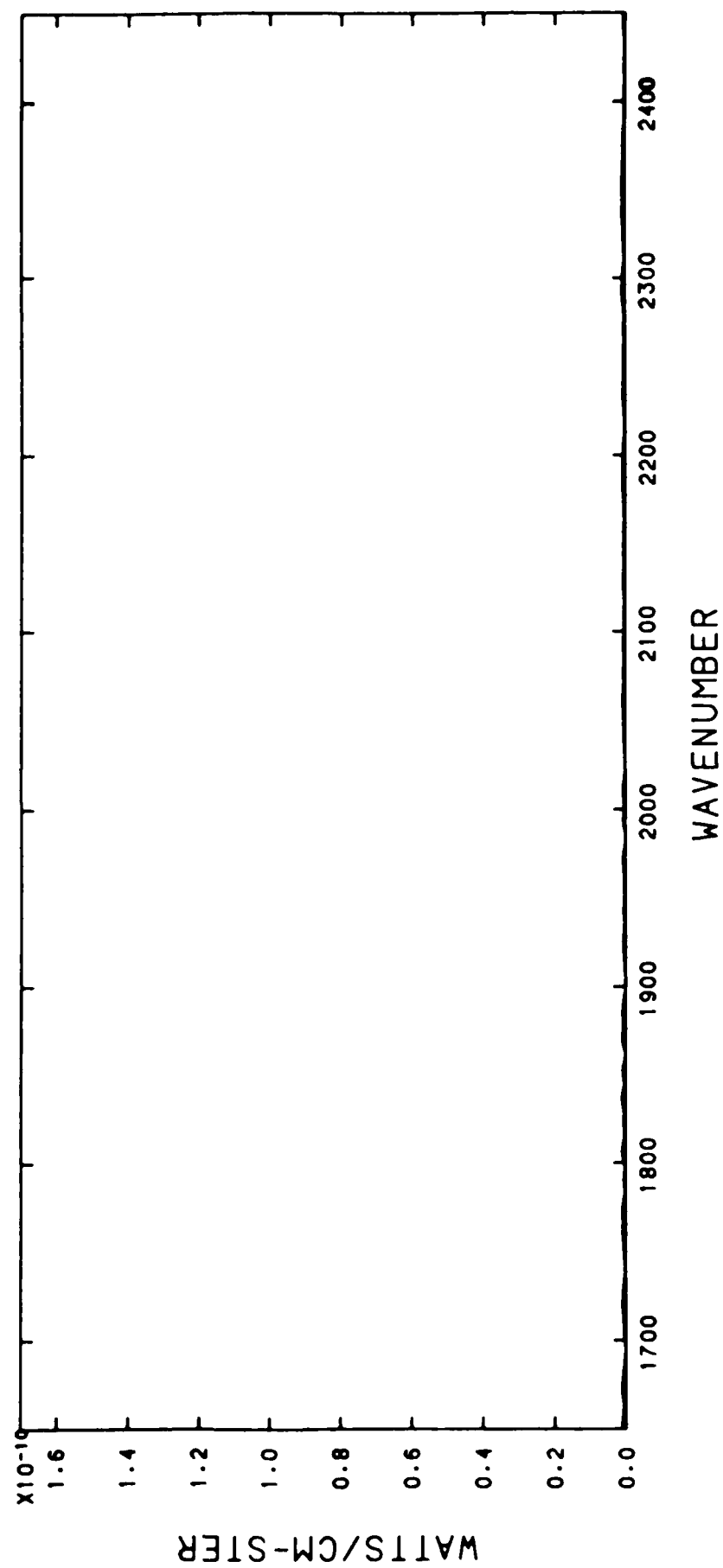


FILE 51, TIME 9: 9: 4.882, ALT 136.3-136.4 KM

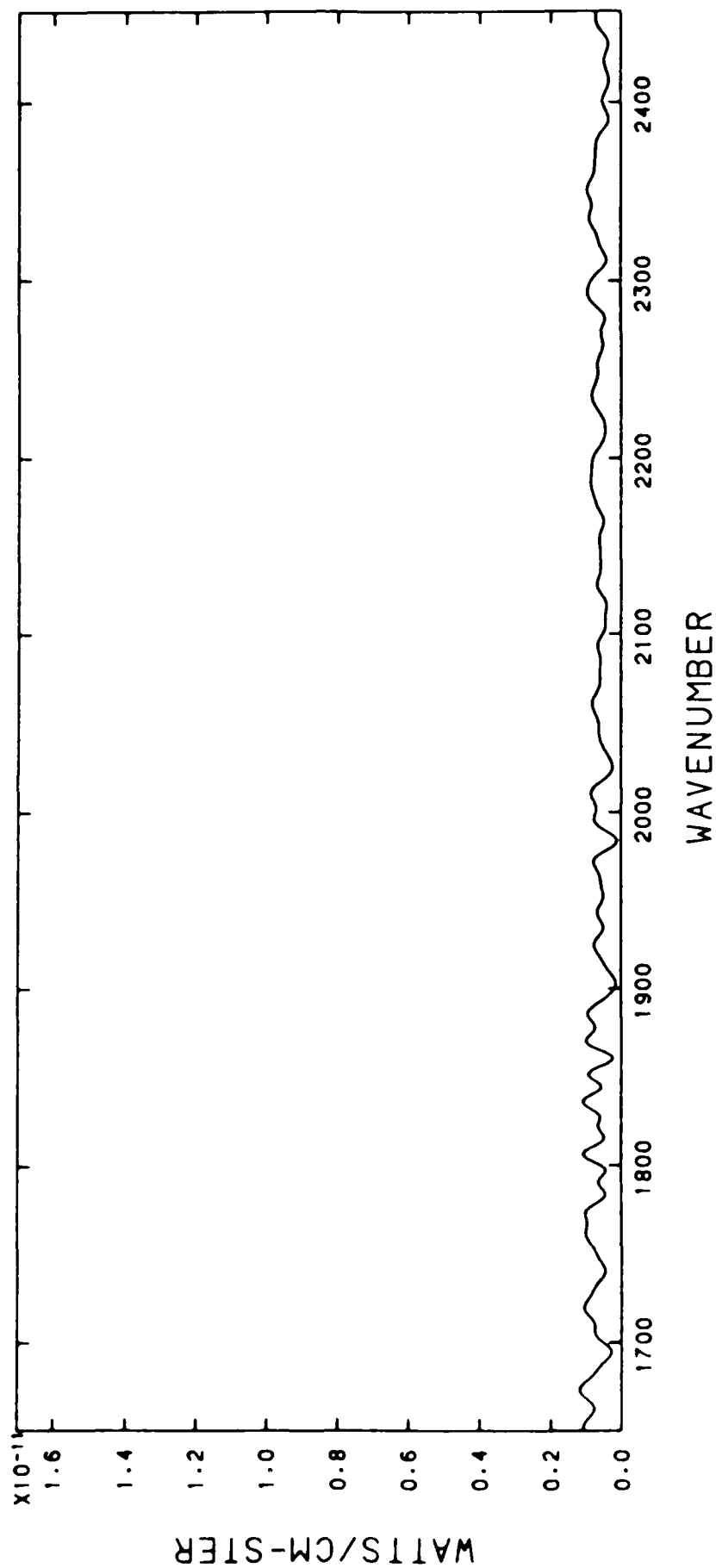
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FILE 51, TIME 9: 9: 4.882, ALT 136.3-136.4 KM

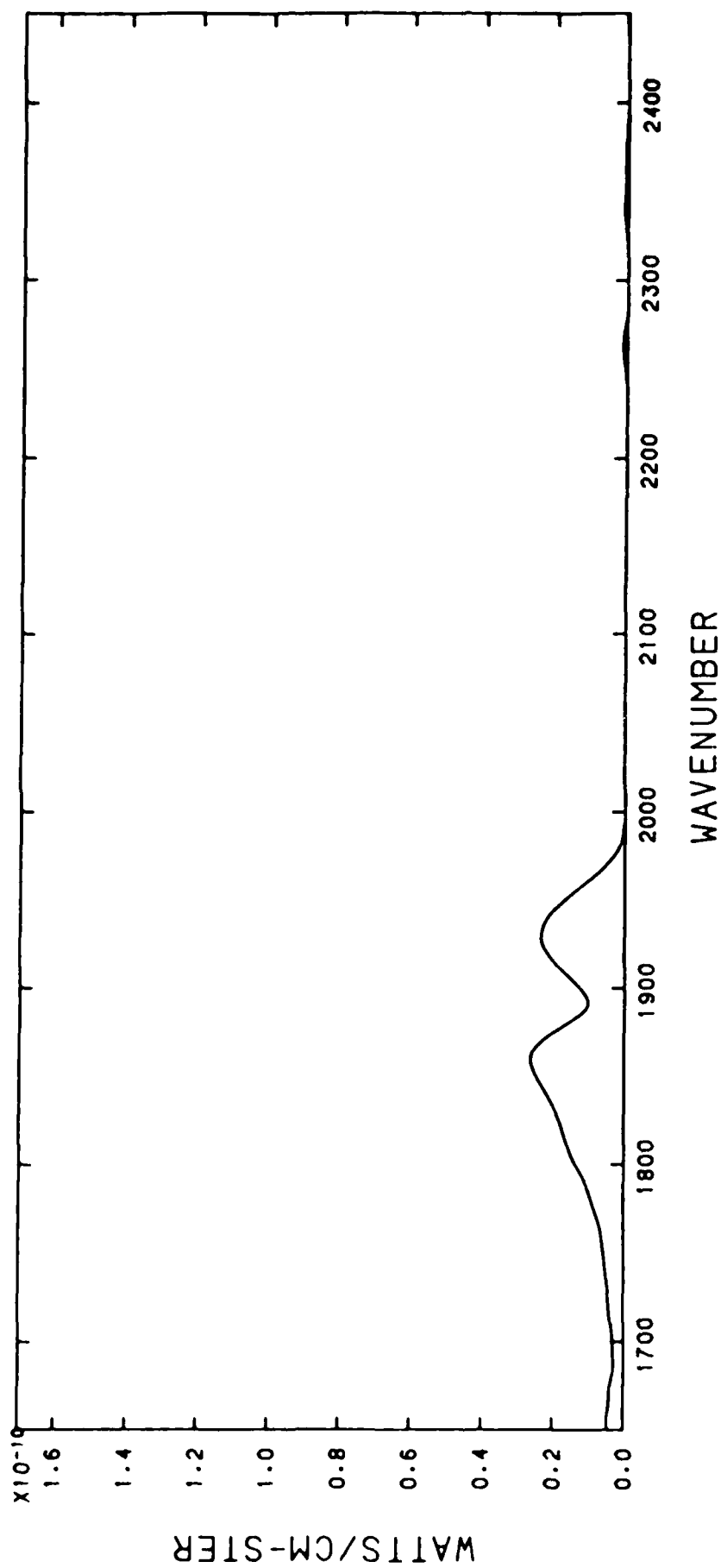


FILE 52, TIME 9: 9: 7.828, ALT 136.9-137.0 KM



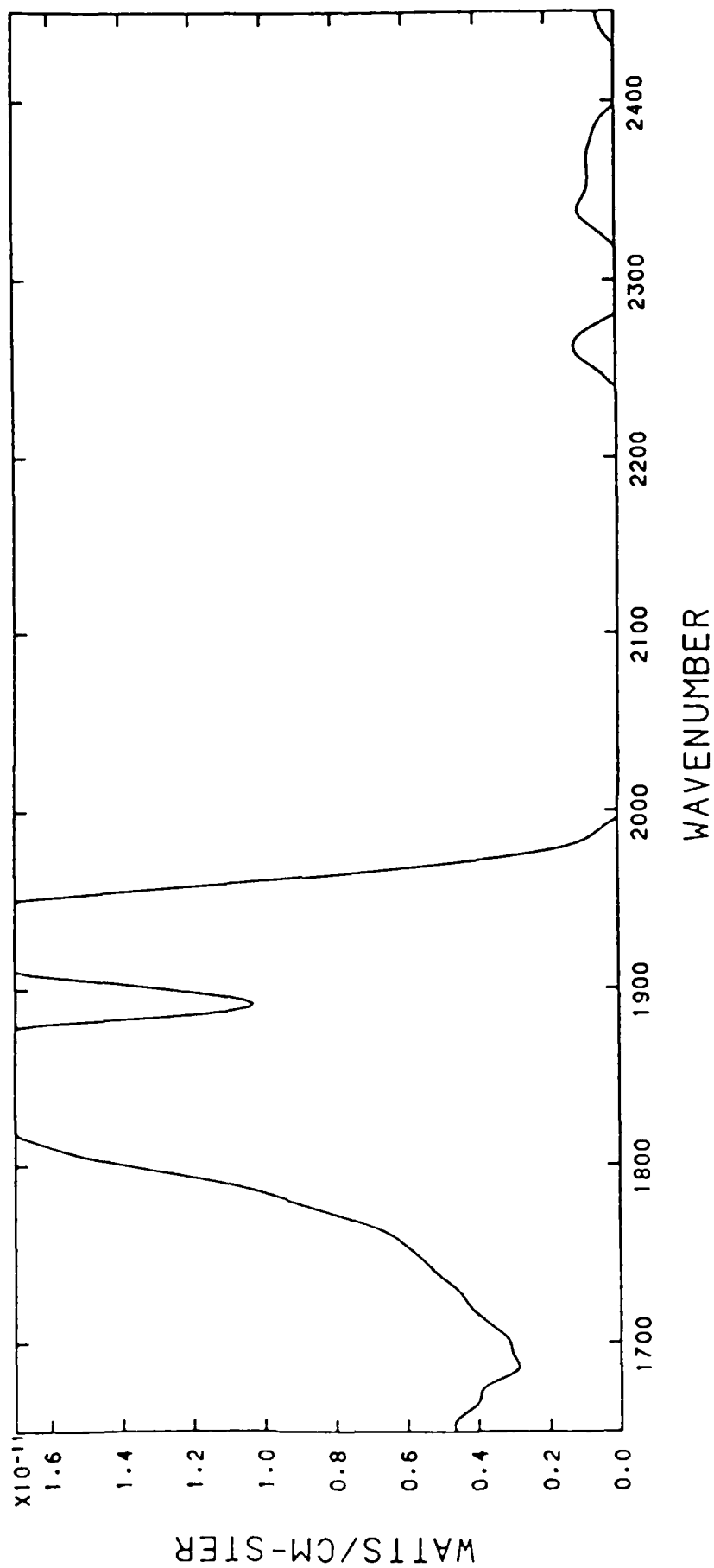
FILE 52, TIME 9: 9: 7.828, ALT 136.9-137.0 KM



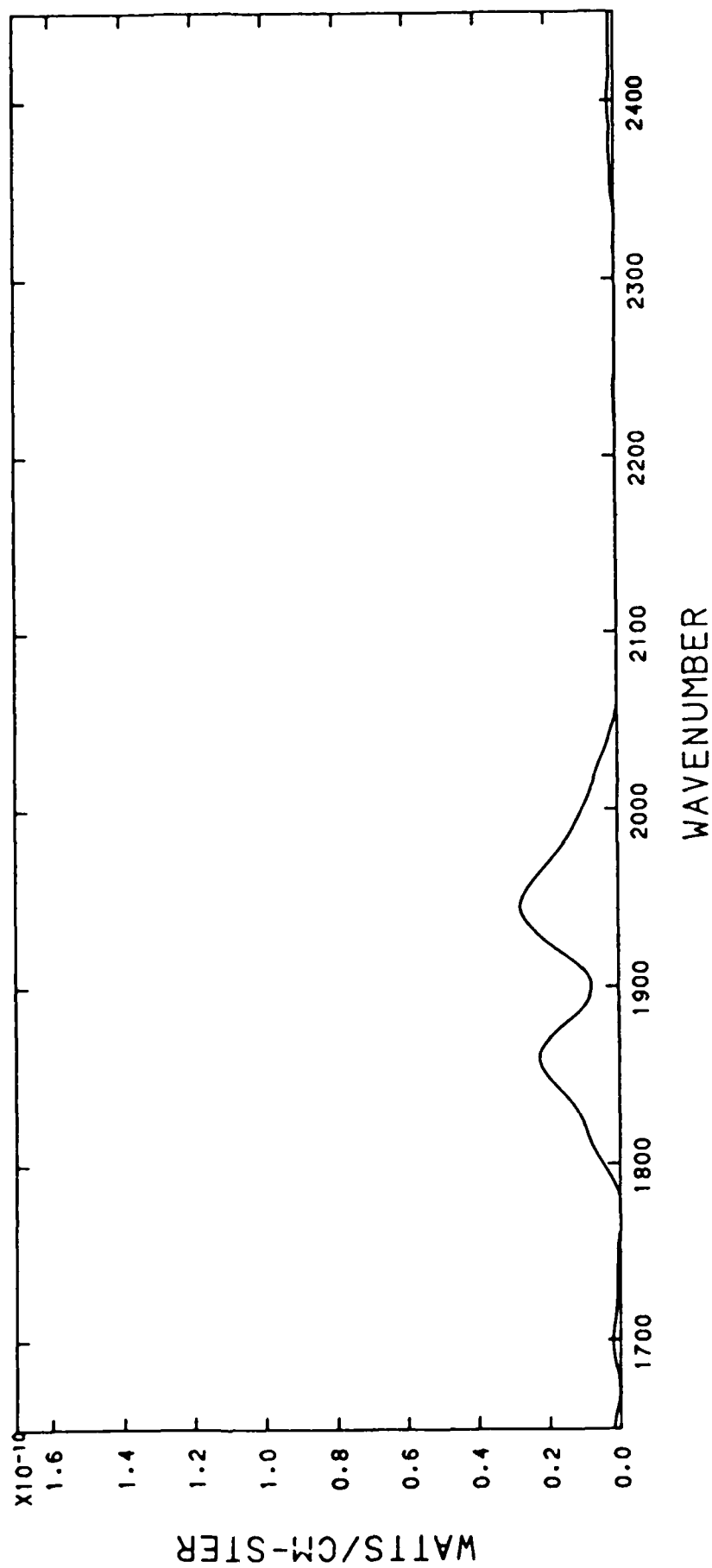


FILE 53, TIME 9: 9: 8.130, ALT 137.0-137.1 KM

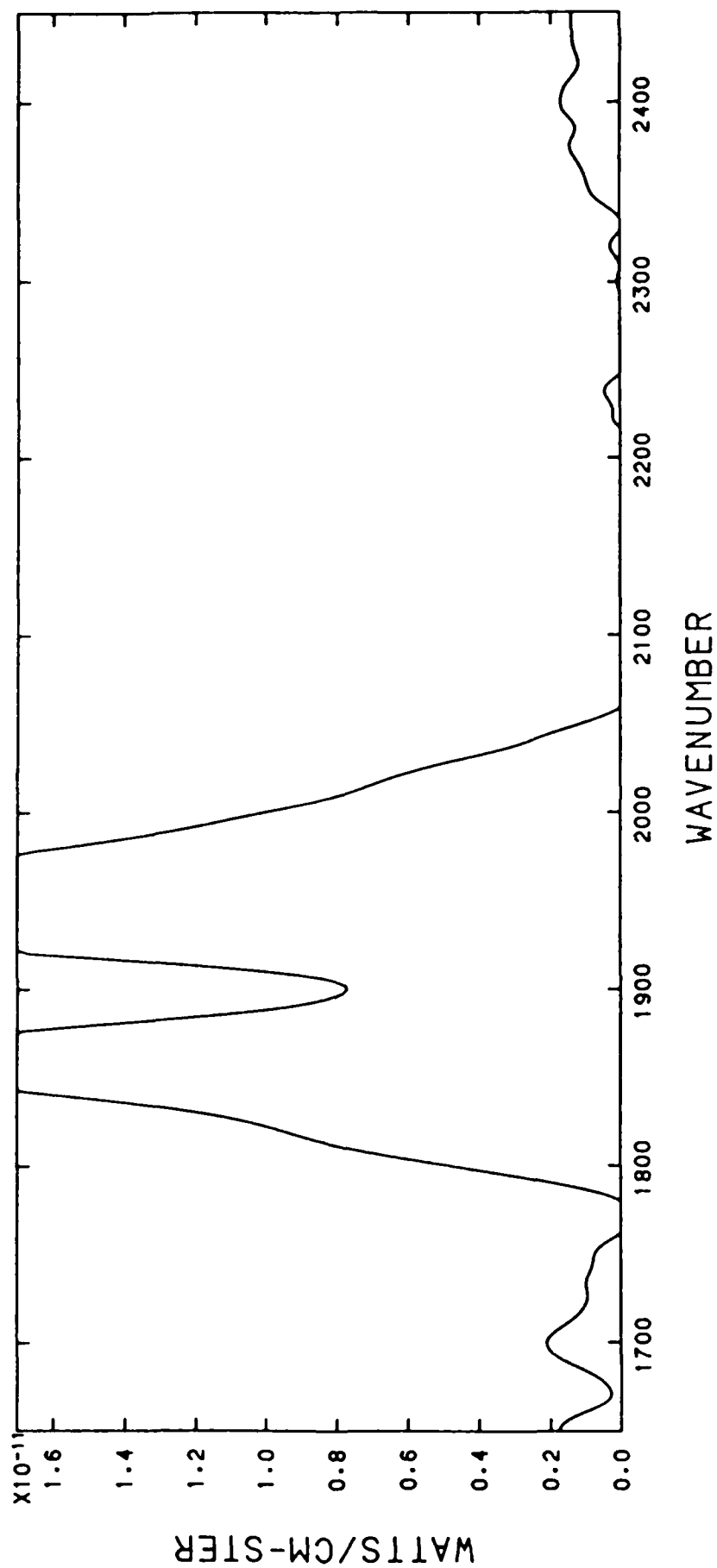
30-NOV-83 09:27



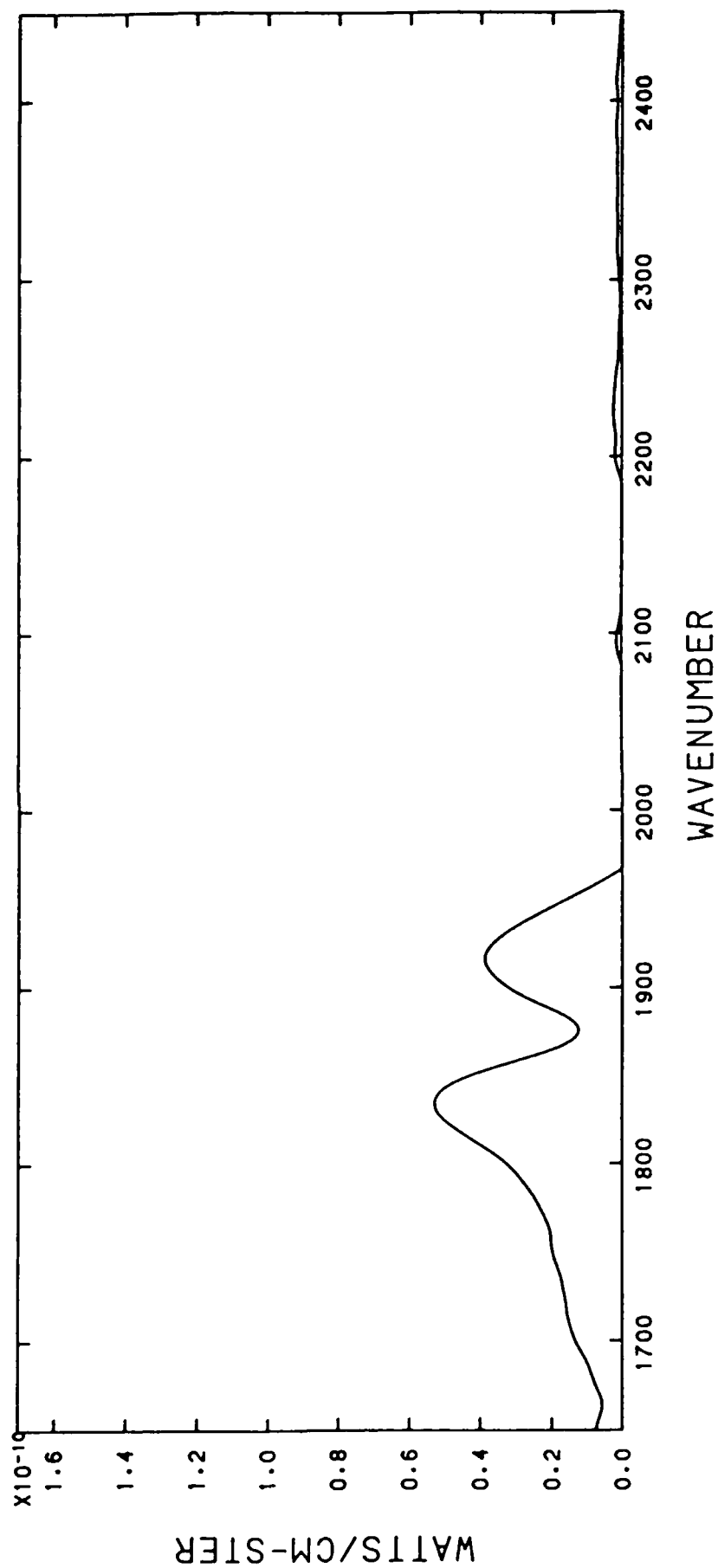
FILE 53, TIME 9: 9: 8.130, ALT 137.0-137.1 KM



FILE 54, TIME 9: 9:10.884, ALT 137.5-137.6 KM

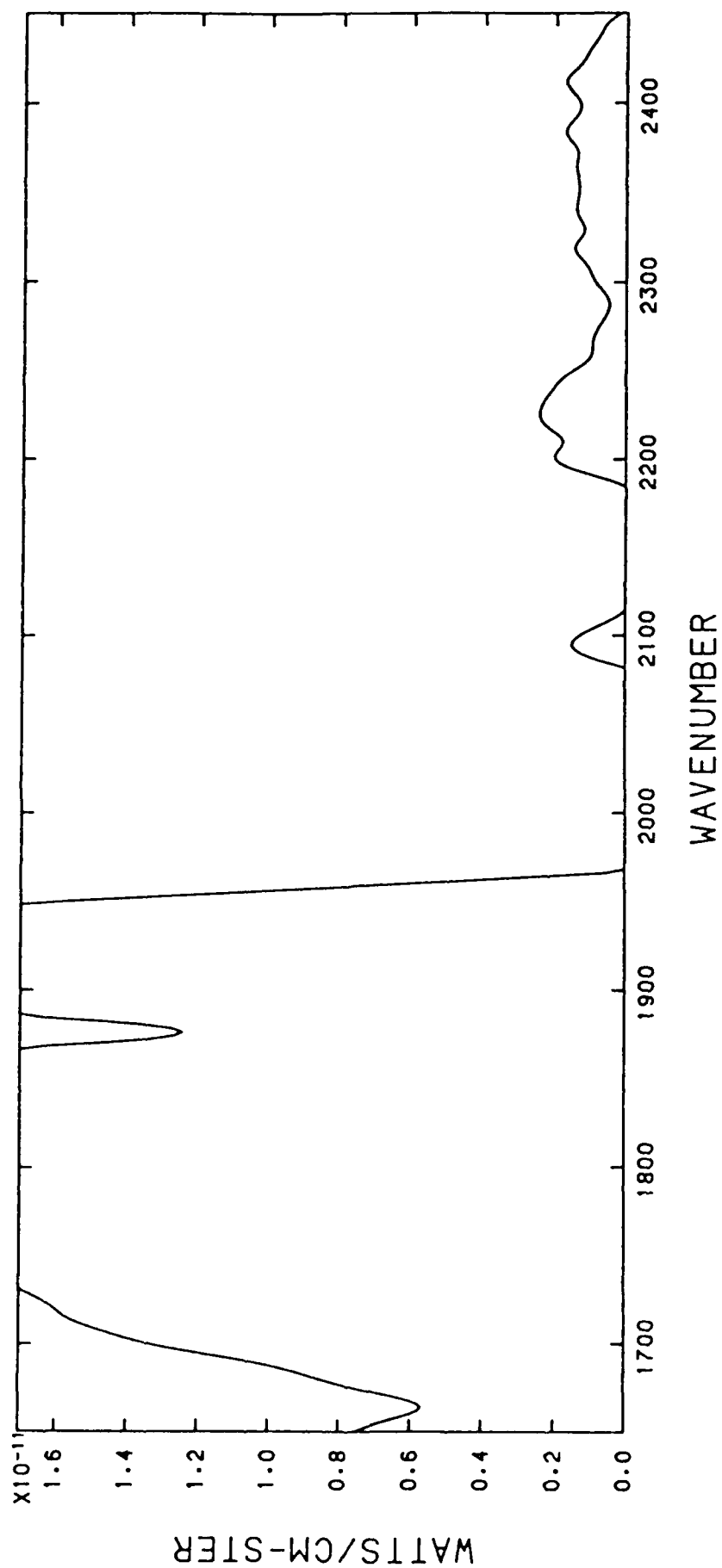


FILE 54, TIME 9: 9:10.884, ALT 137.5-137.6 KM

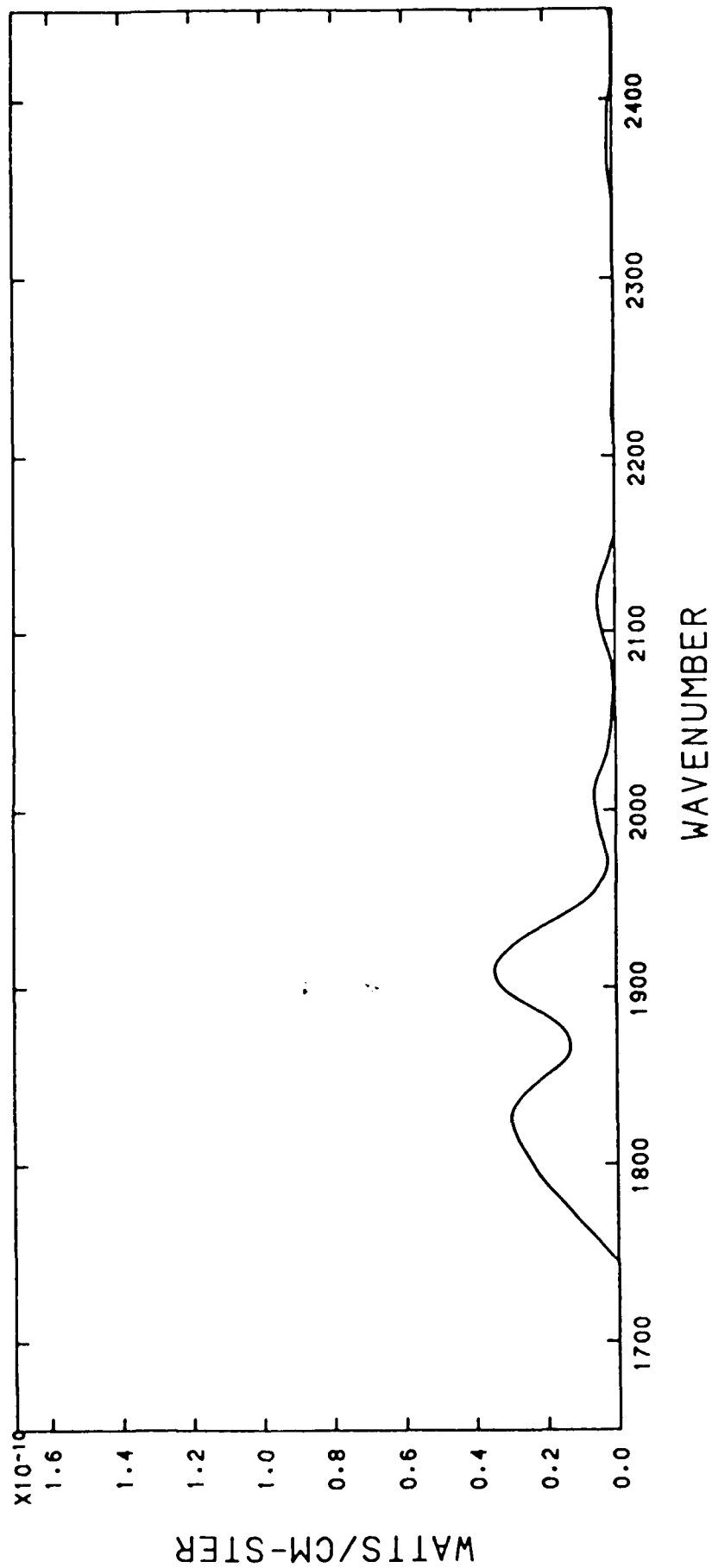


FILE 55, TIME 9: 9:11.380, ALT 137.6-137.7 KM

30-NOV-83 09:27

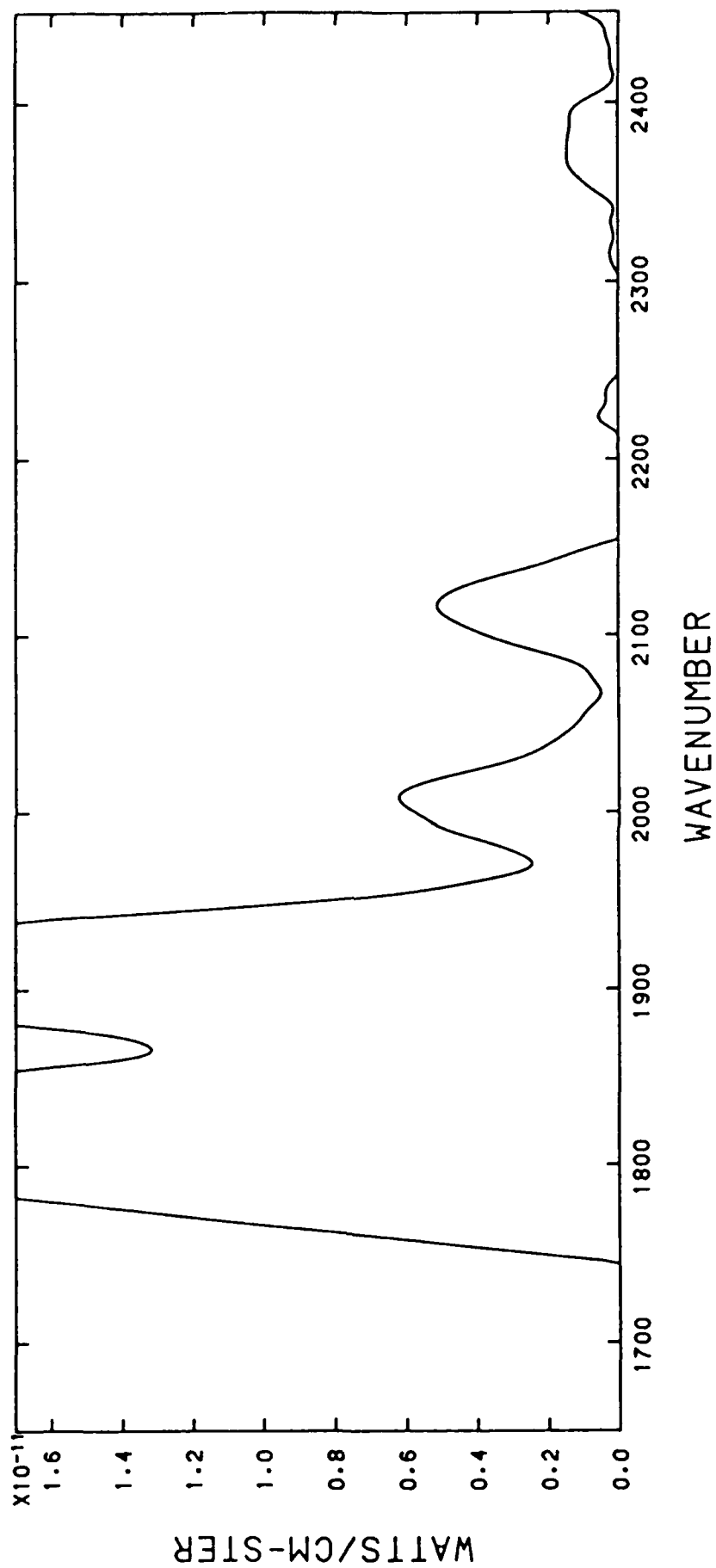


FILE 55, TIME 9: 9:11.380, ALT 137.6-137.7 KM



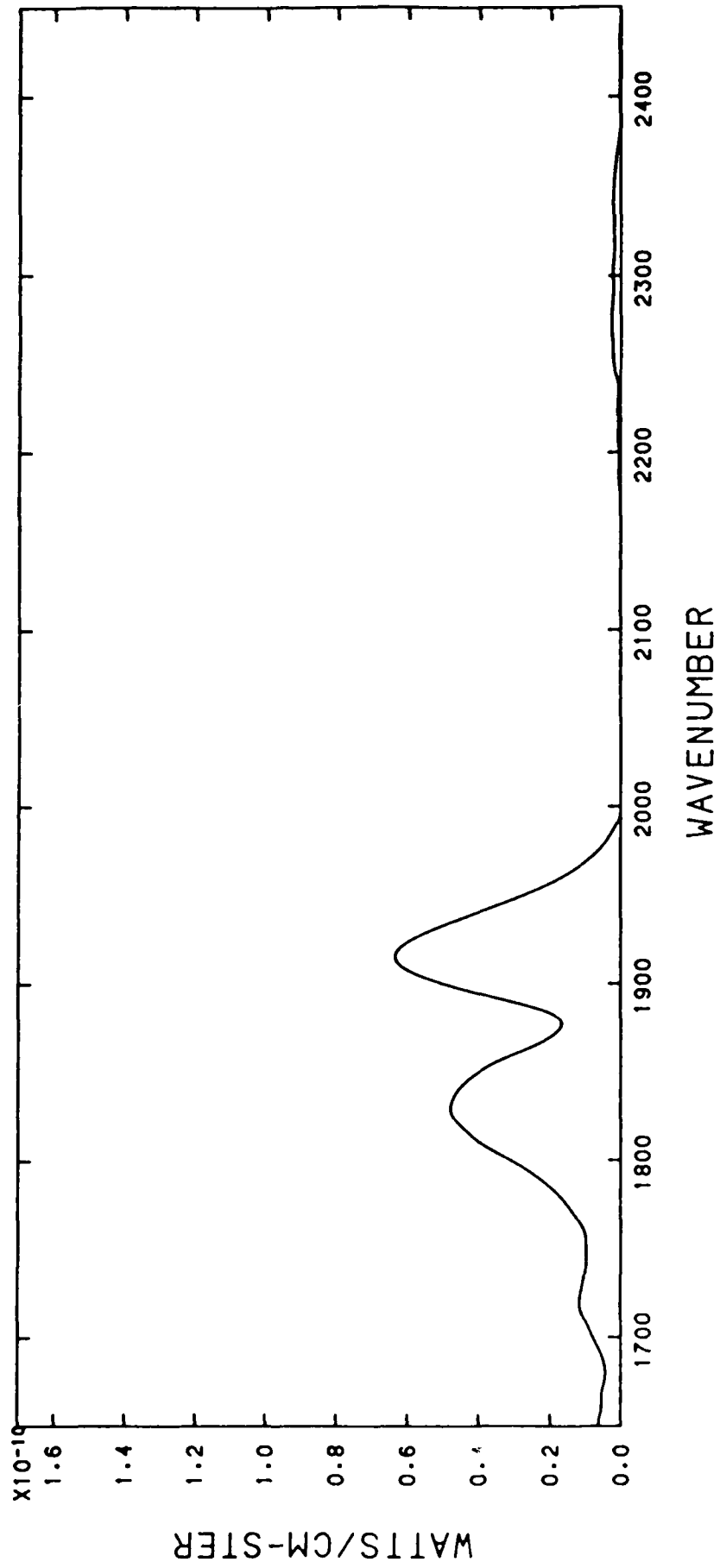
FILE 56, TIME 9: 9:14.132, ALT 138.1-138.1 KM

30-NOV-83 09:28



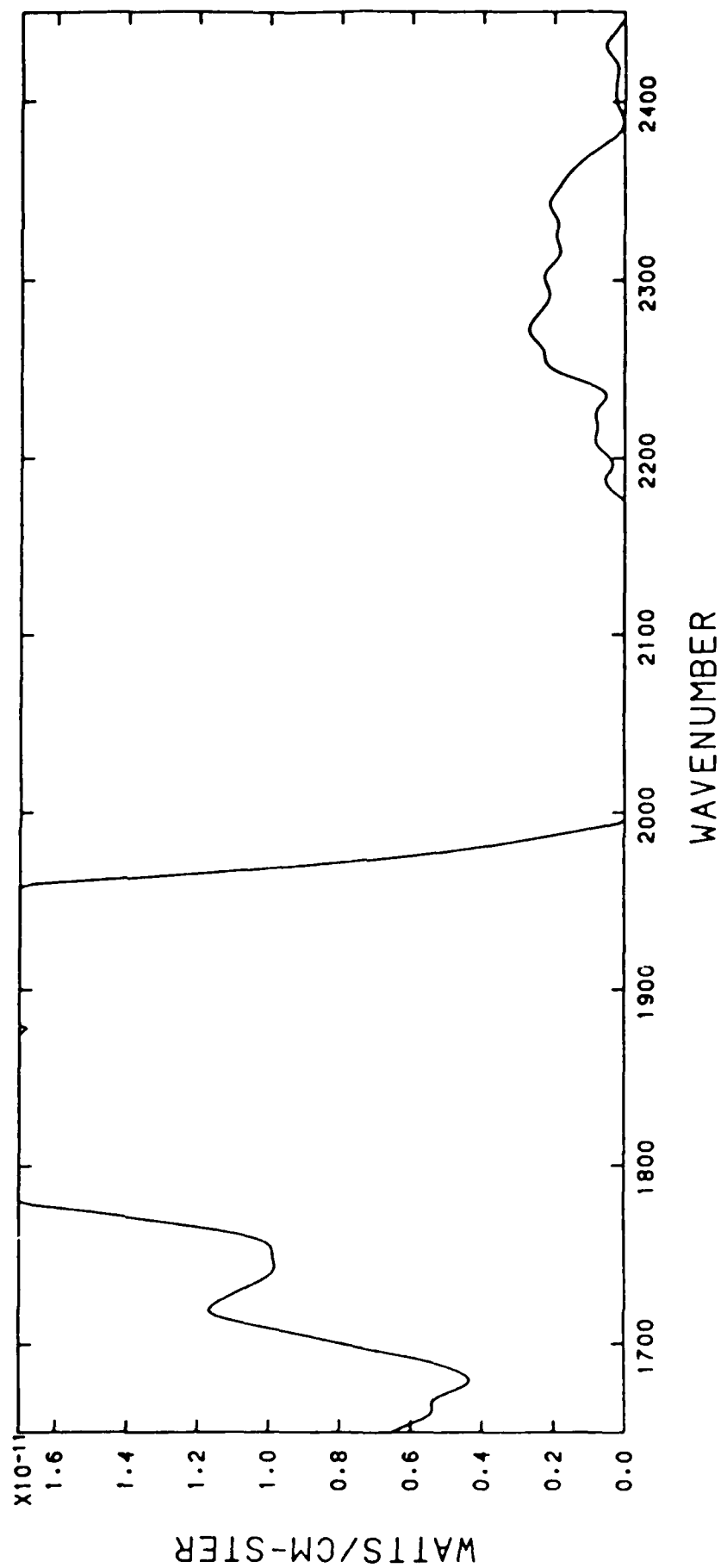
FILE 56, TIME 9: 9:14.132, ALT 138.1-138.1 KM





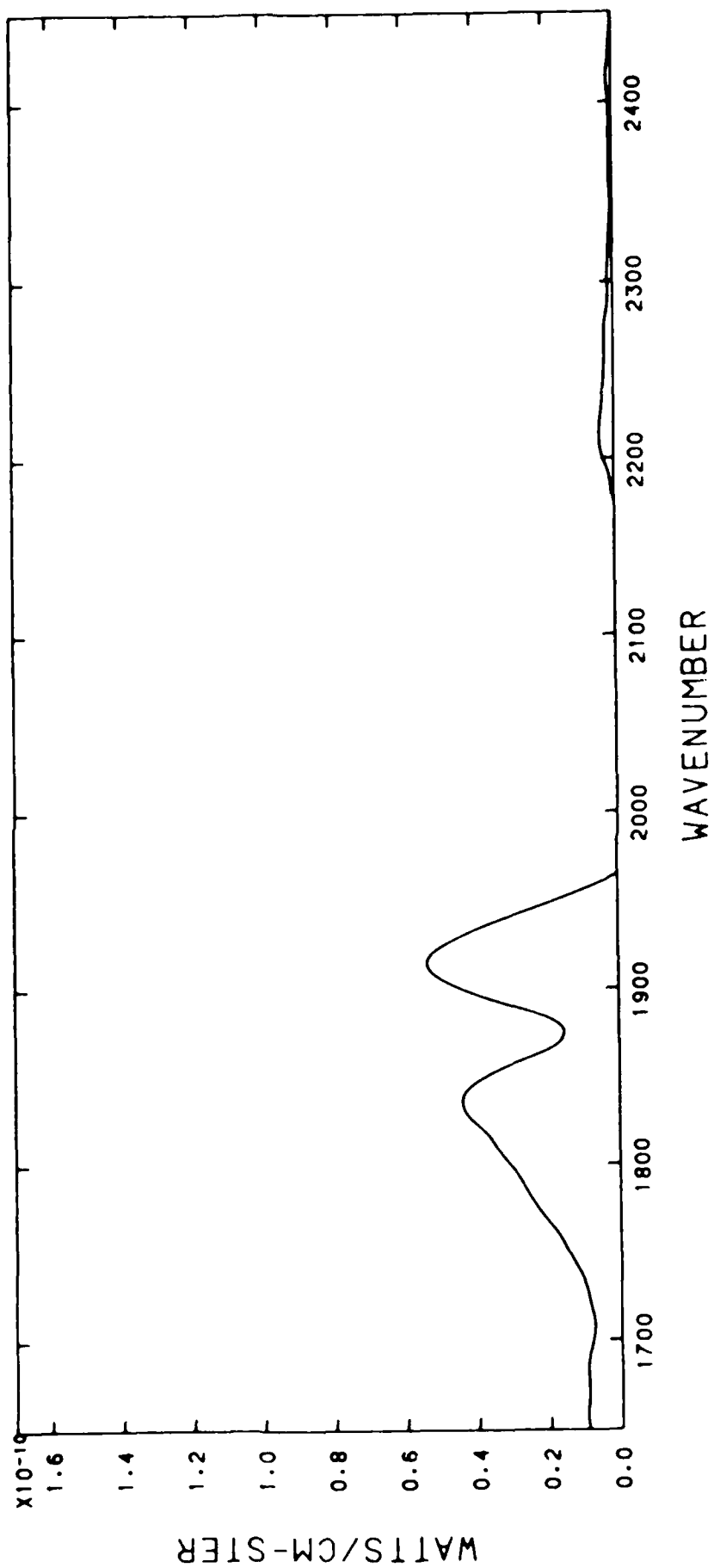
FILE 57, TIME 9: 9:14.628, ALT 138.2-138.2 KM

30-NOV-83 09:28



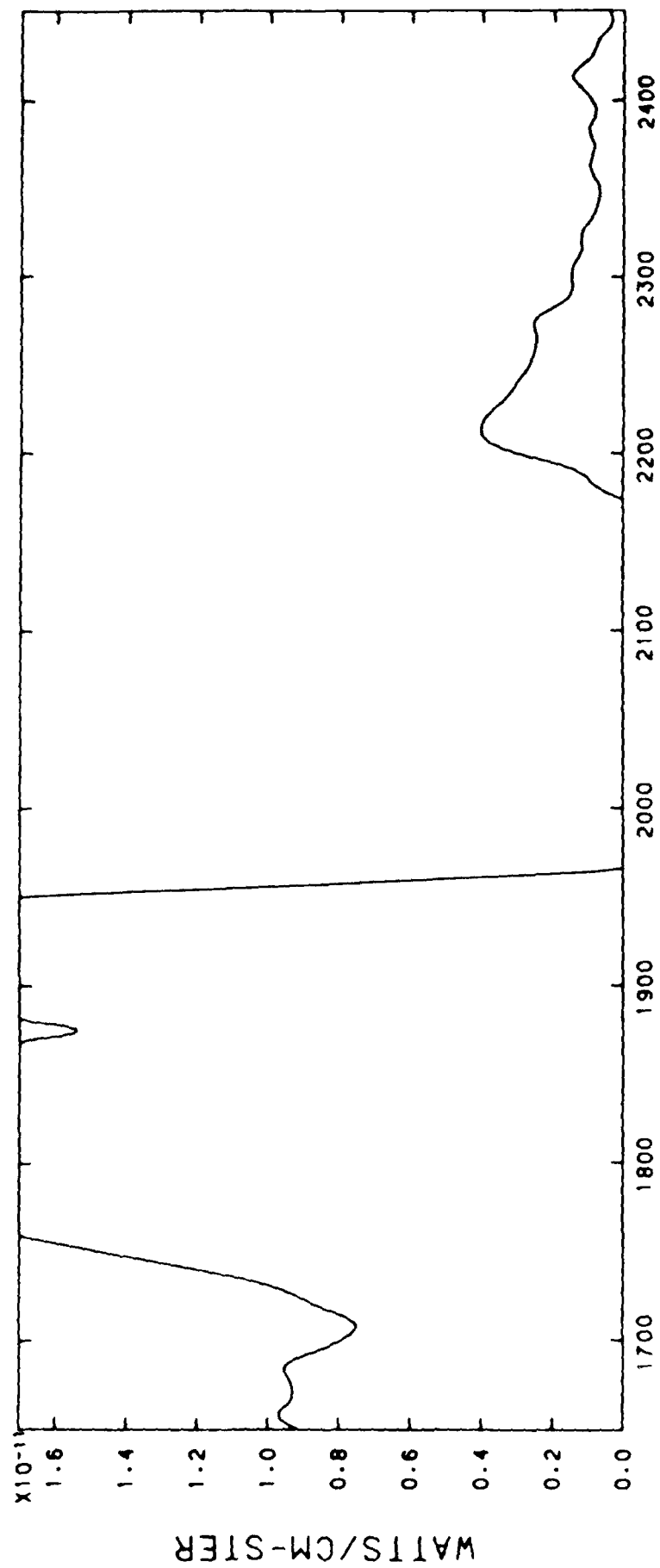
FILE 57, TIME 9: 9:14.628, ALT 138.2-138.2 KM

30-NOV-83 09:28



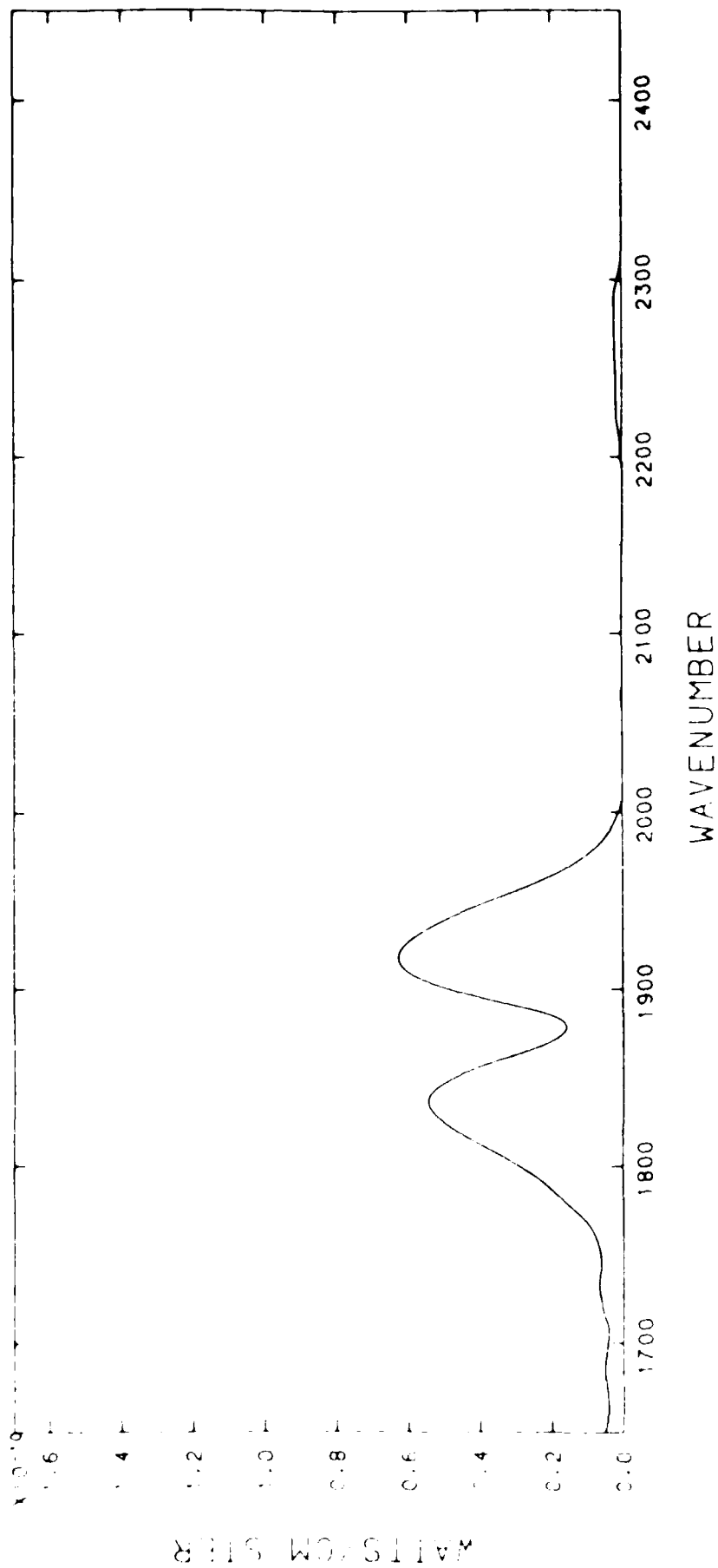
FILE 58, TIME 9: 9:17.382, ALT 138.5-138.6 KM

30-807-83 09:28

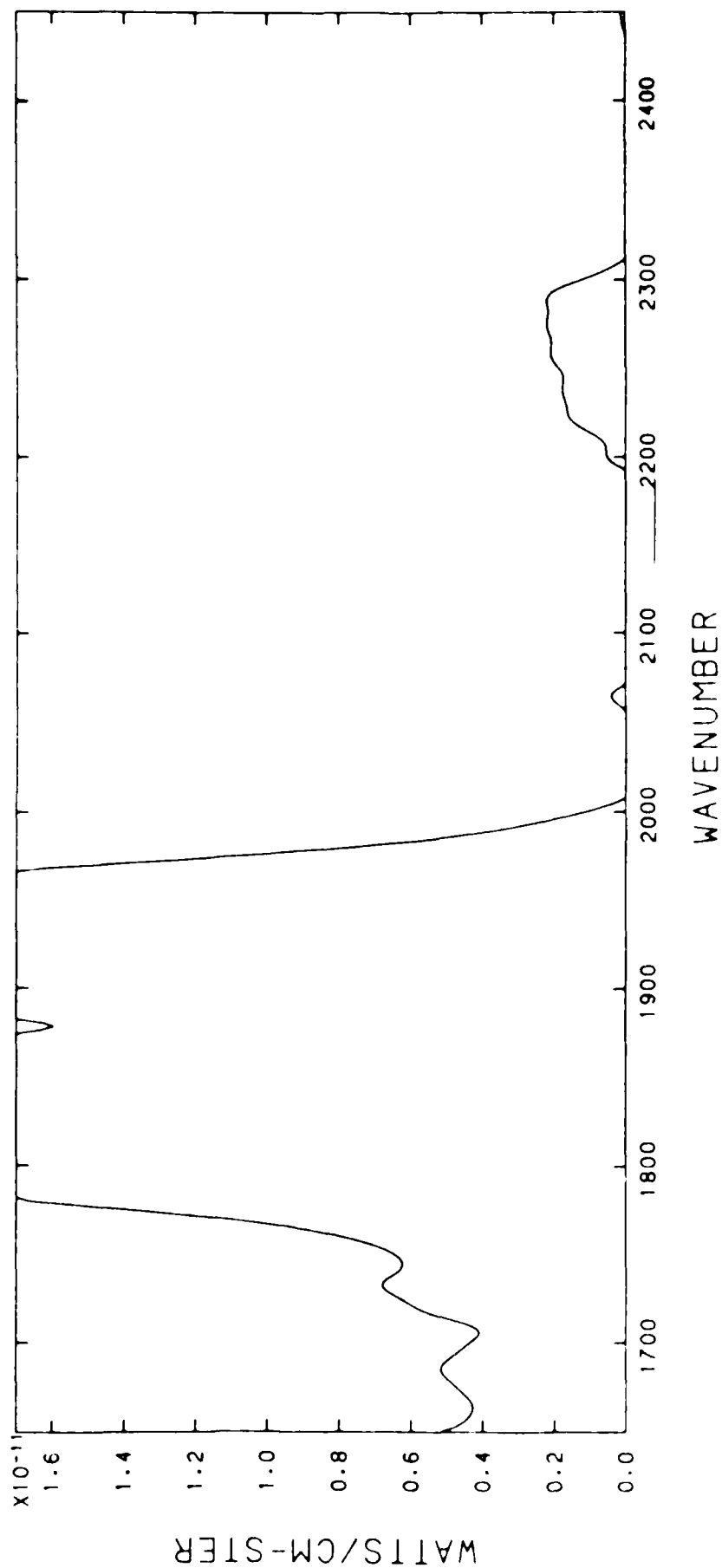


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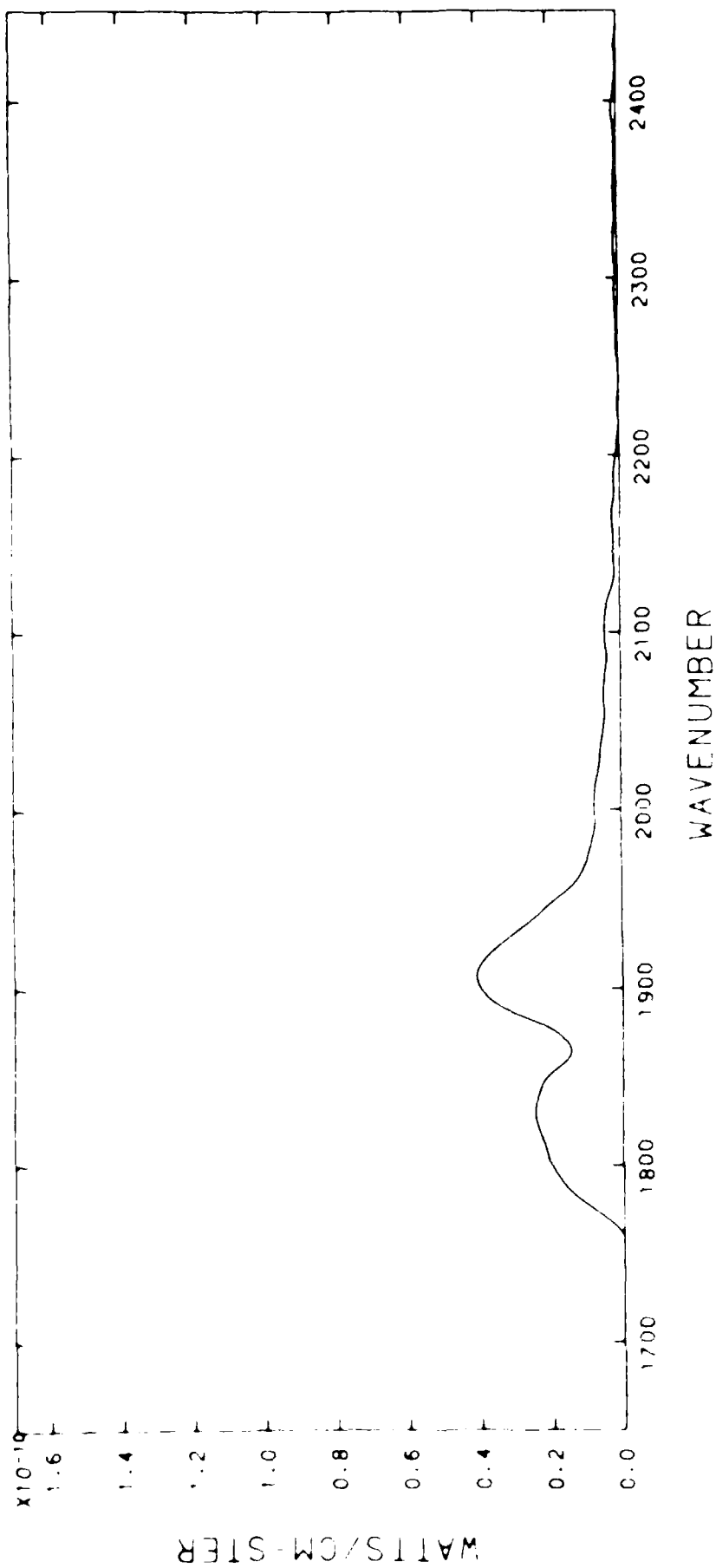
FILE 58, TIME 9: 9:17.382, ALT 138.5-138.6 KM



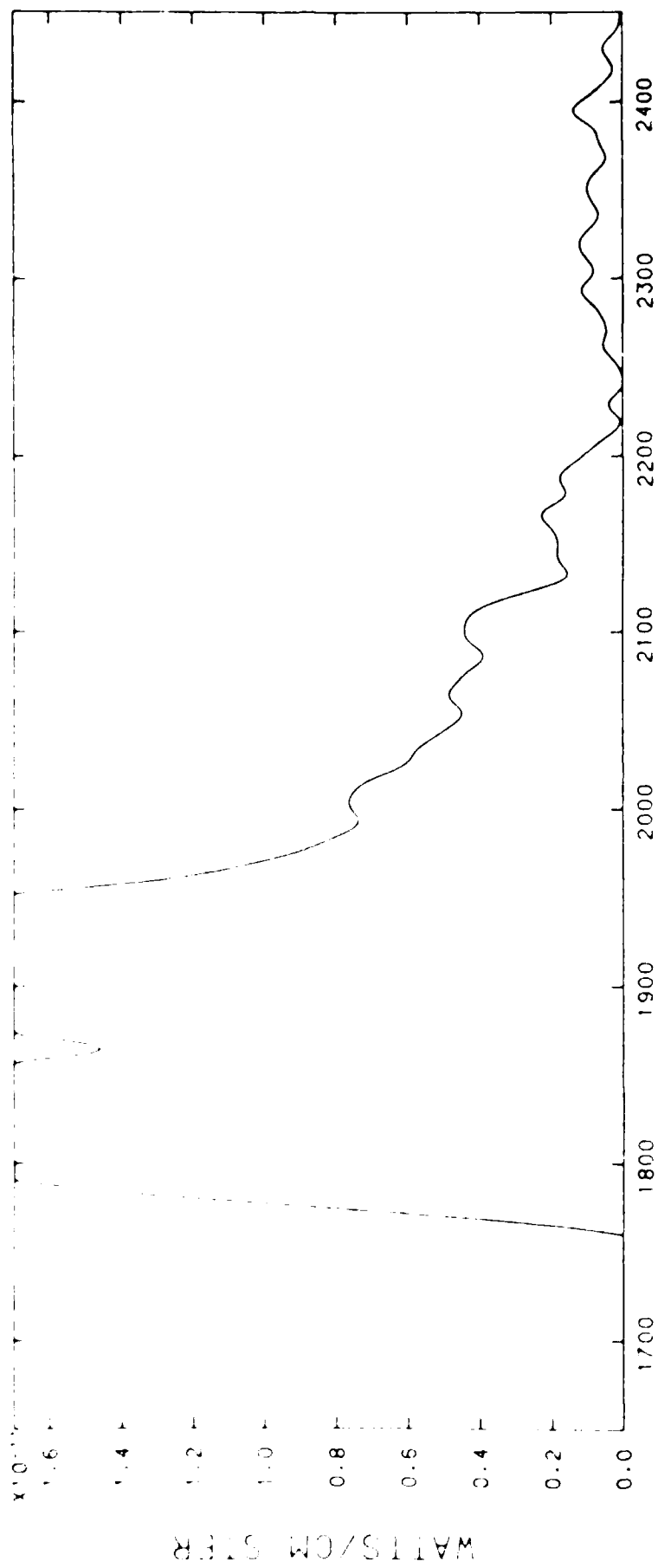
FILE 59, TIME 9: 9:17.880, ALT 138.6-138.6 KM



FILE 59. TIME 9: 9:17.880. ALT 138.6-138.6 KM

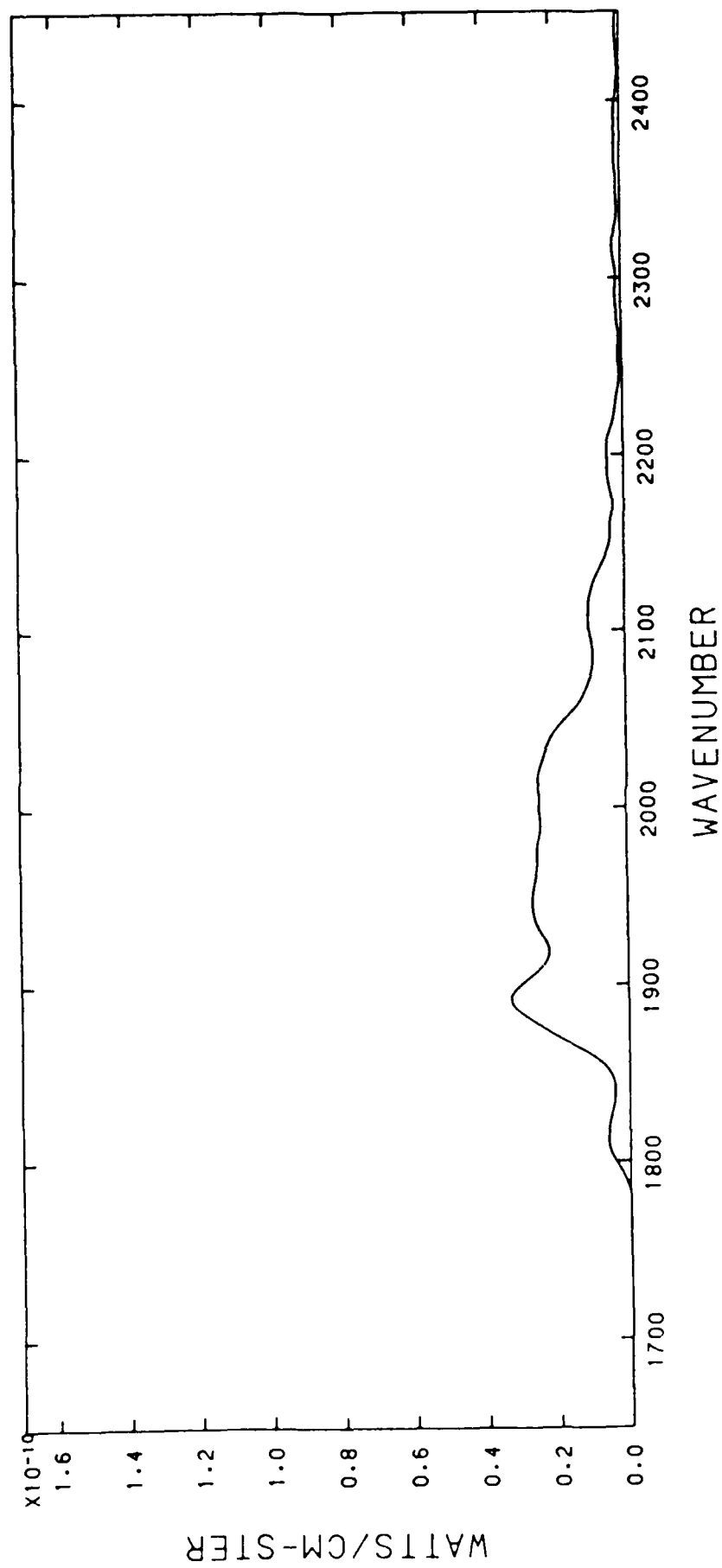


FILE 60, TIME 9: 9:20.630, ALT 138.9-138.9 KM



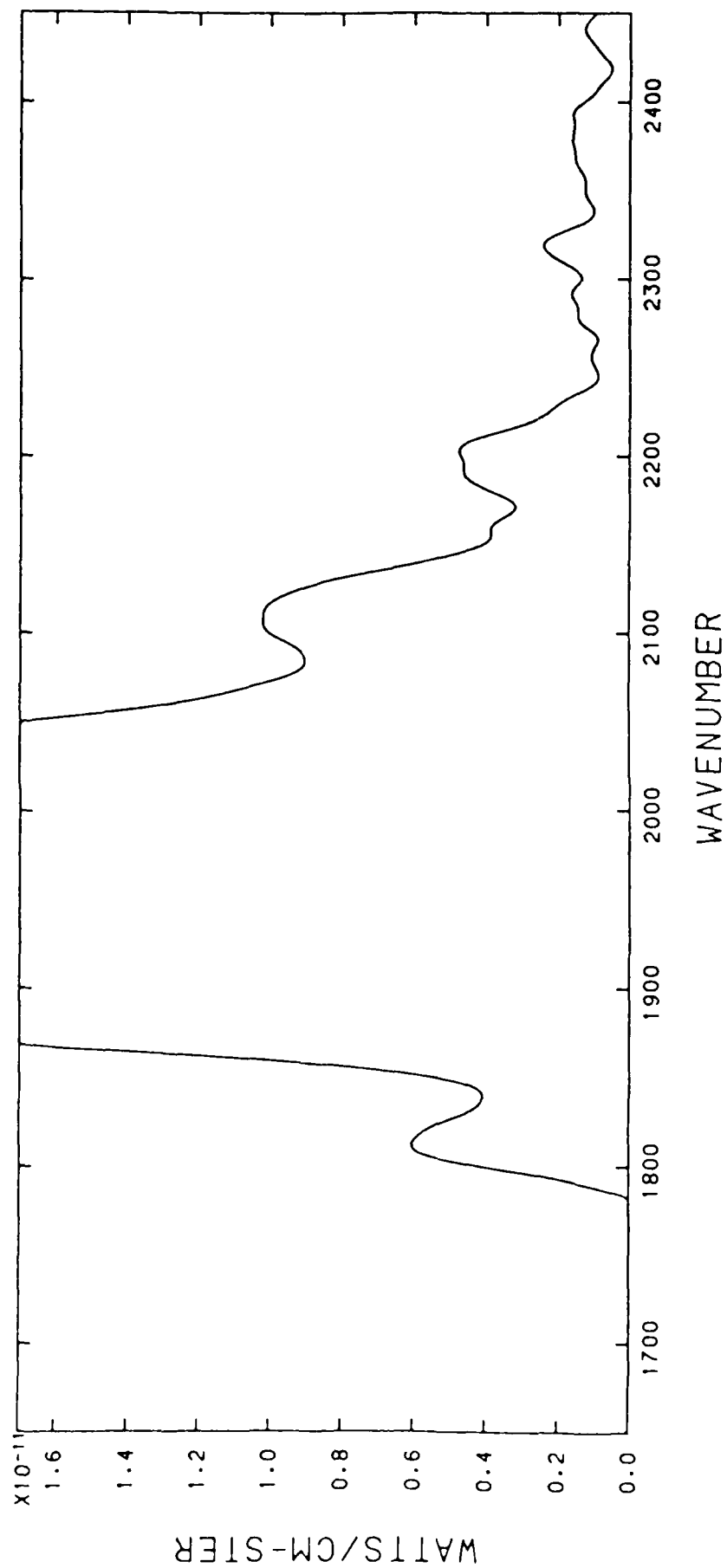
FILE 60, TIME 9: 9:20.630, ALT 138.9-138.9 KM



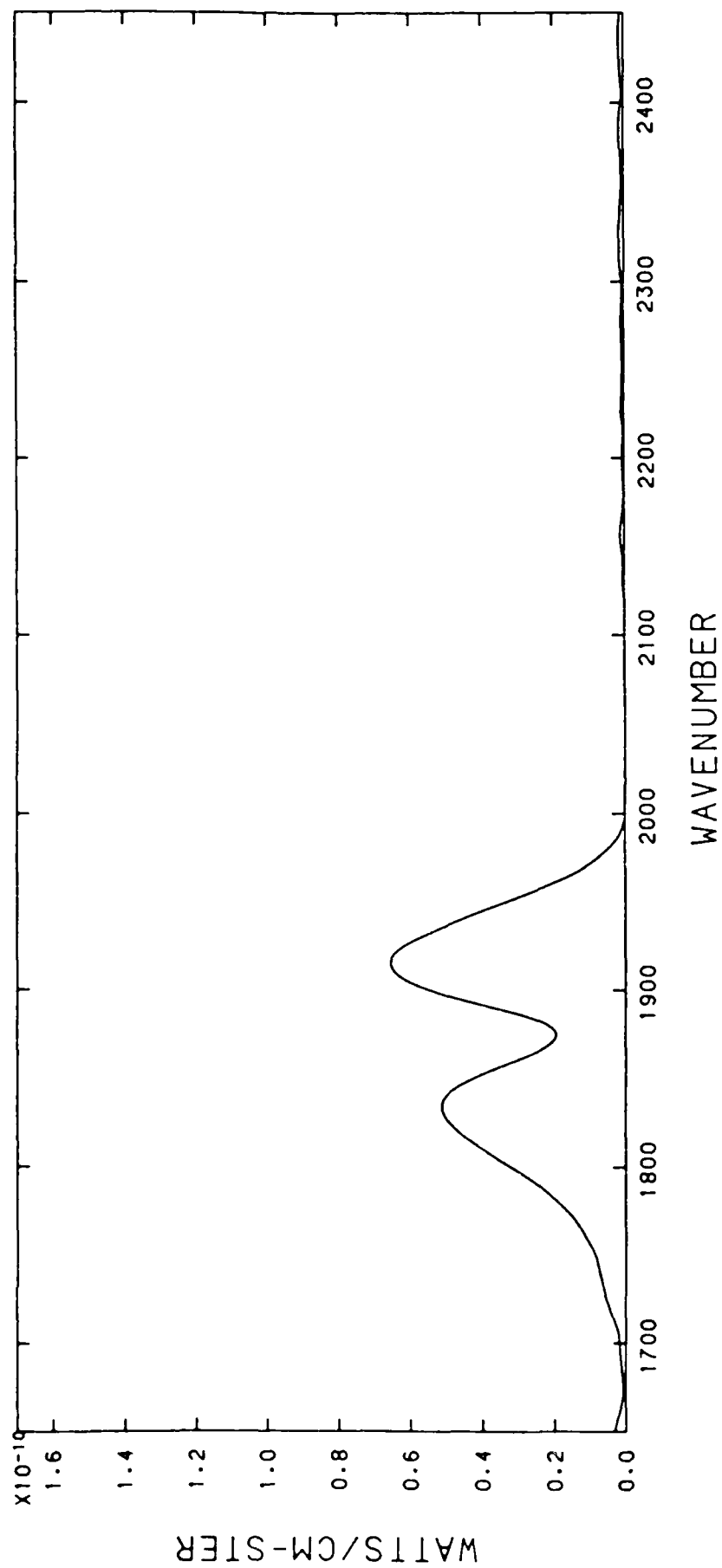


FILE 61, TIME 9: 9:21.128, ALT 138.9-138.9 KM

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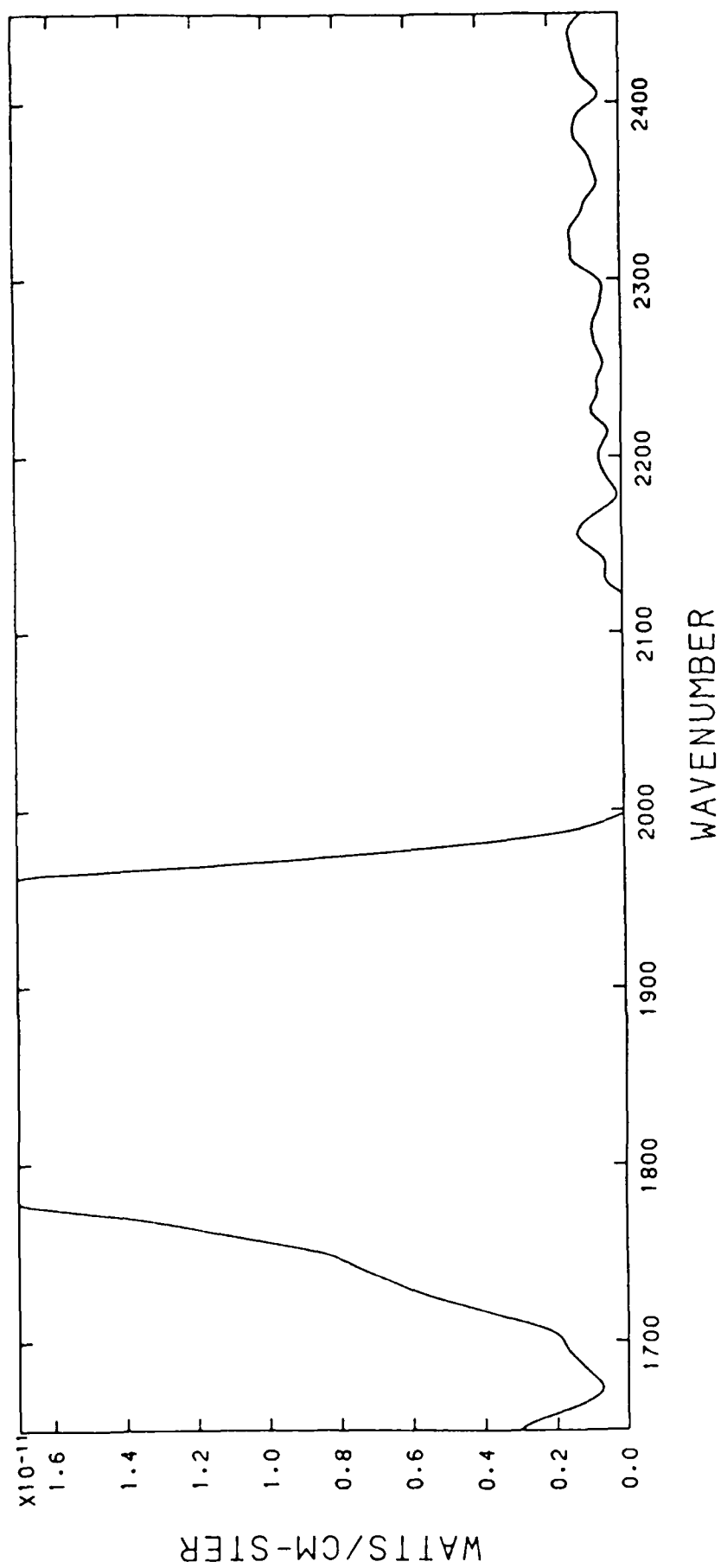


FILE 61, TIME 9: 9:21.128, ALT 138.9-138.9 KM

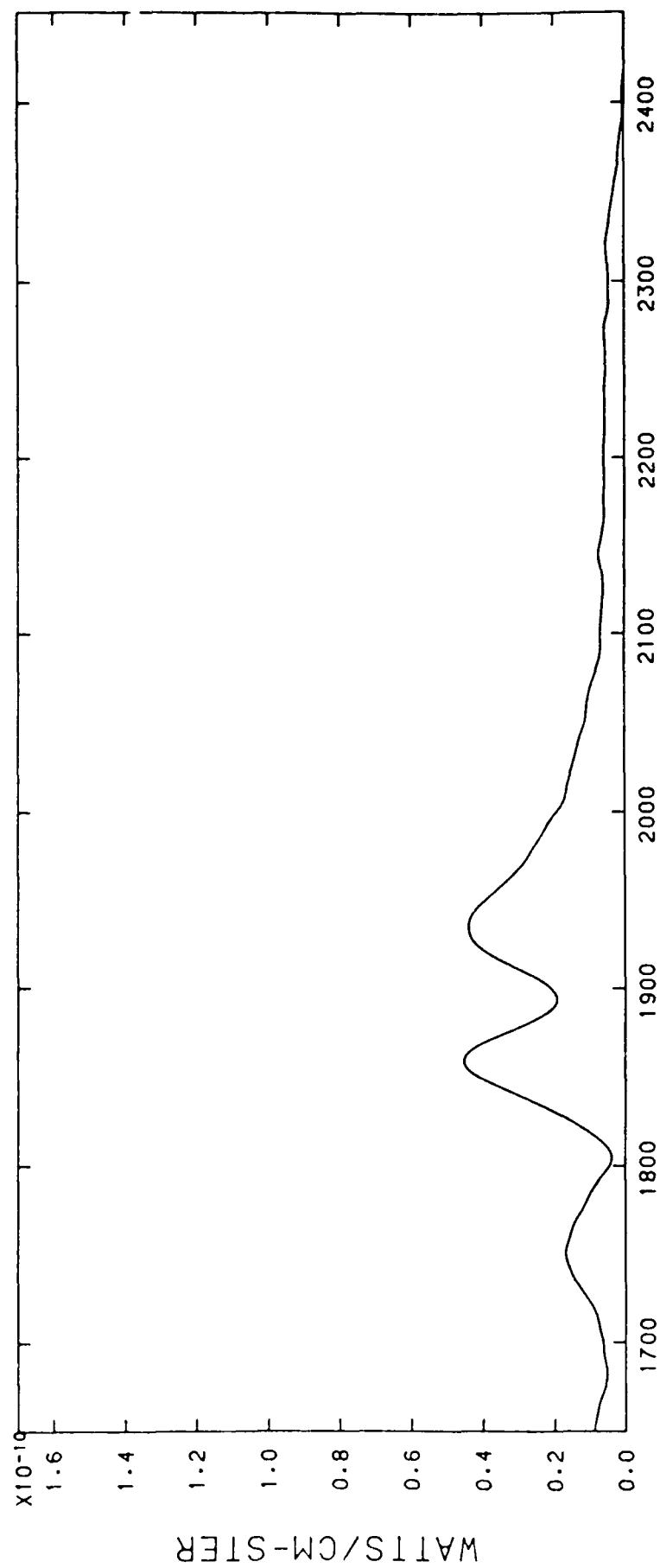


FILE 62, TIME 9: 9:23.882, ALT 139.1-139.1 KM

30-NOV-83 09:29



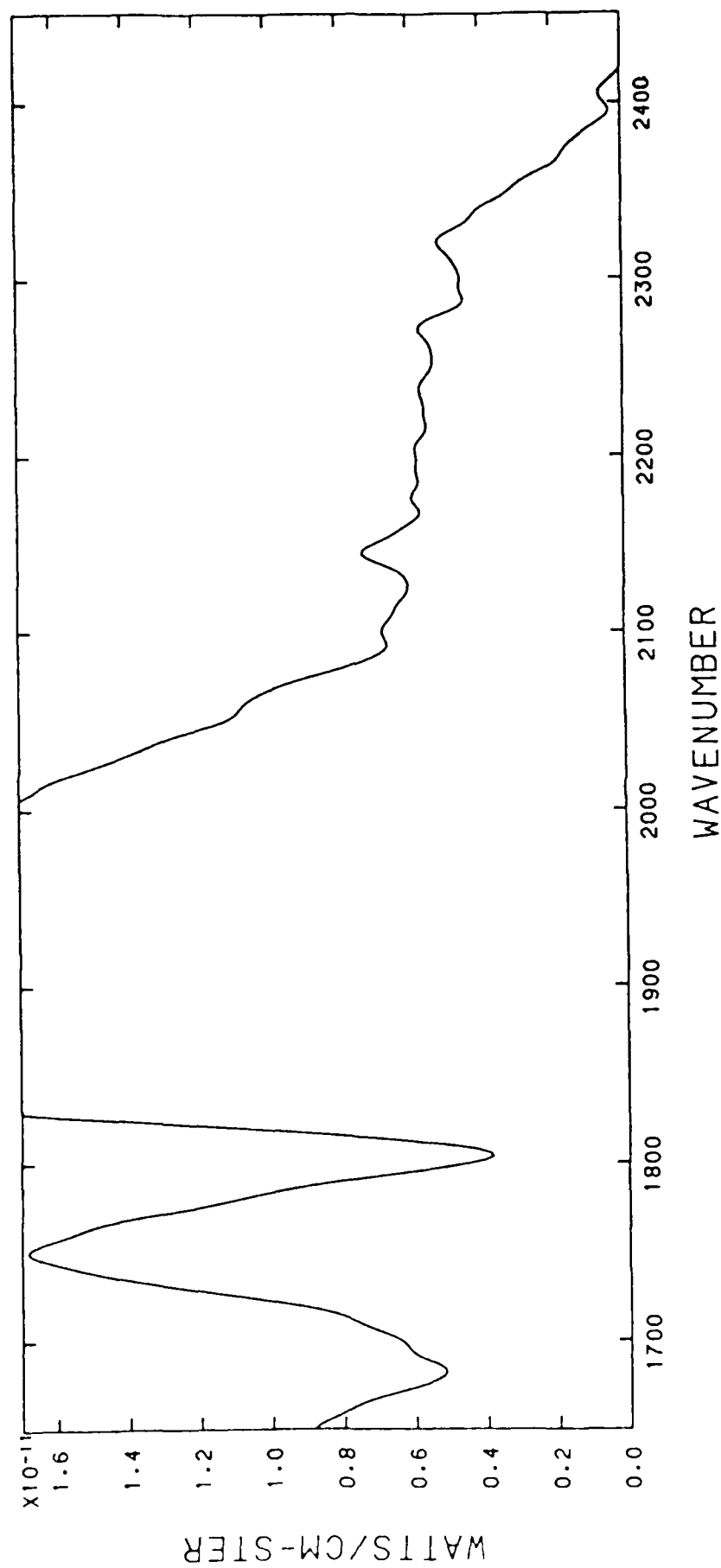
FILE 62, TIME 9: 9:23.882, ALT 139.1-139.1 KM



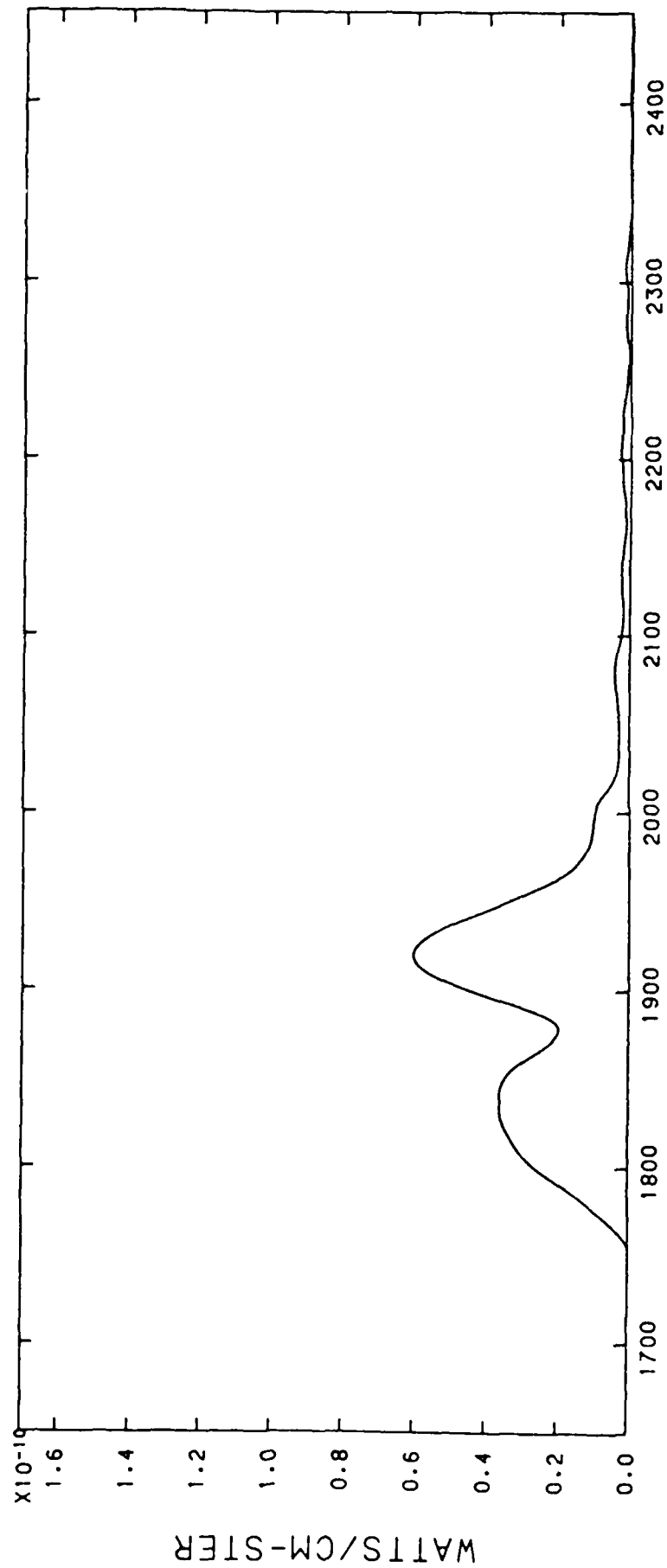
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FILE 63, TIME 9: 9:24.380, ALT 139.1-139.2 KM

30-NOV-83 09:29

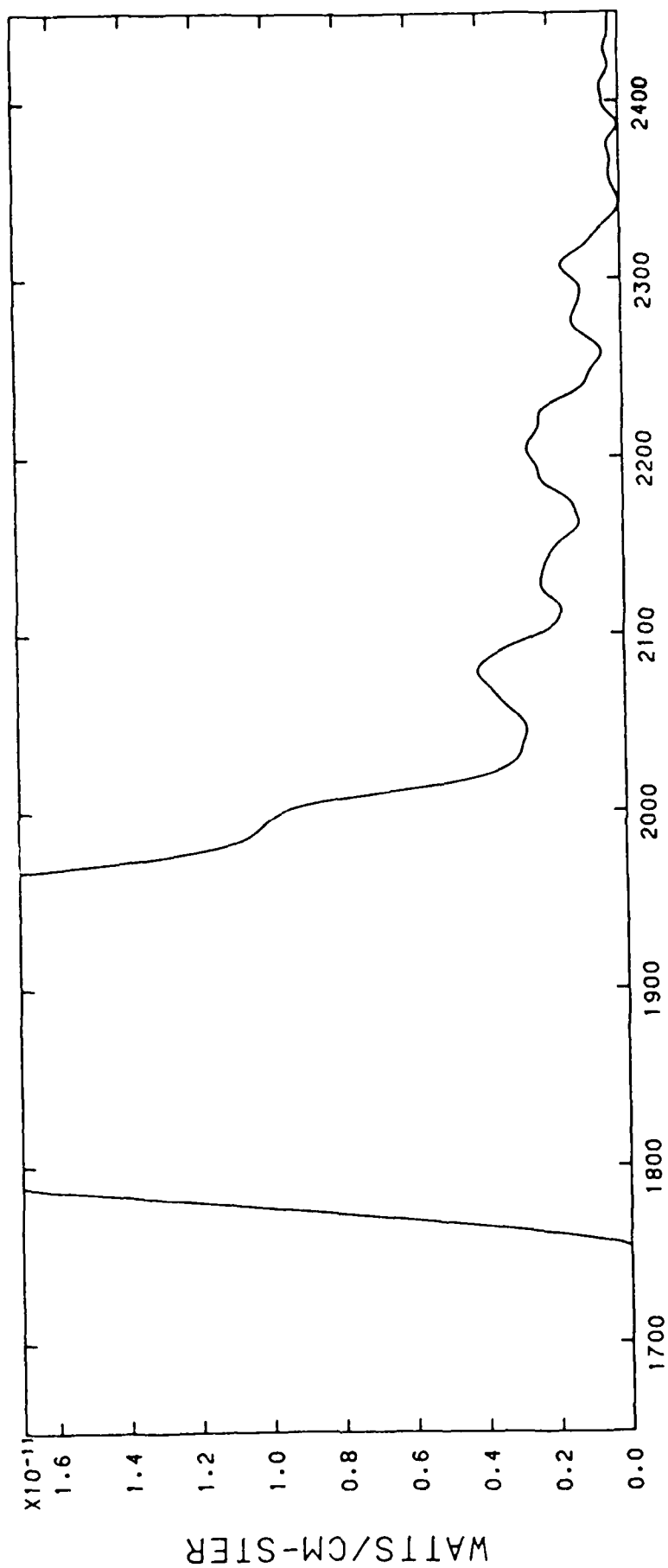


FILE 63, TIME 9: 9:24.380, ALT 139.1-139.2 KM



FILE 64, TIME 9: 9:27.132, ALT 139.3-139.3 KM

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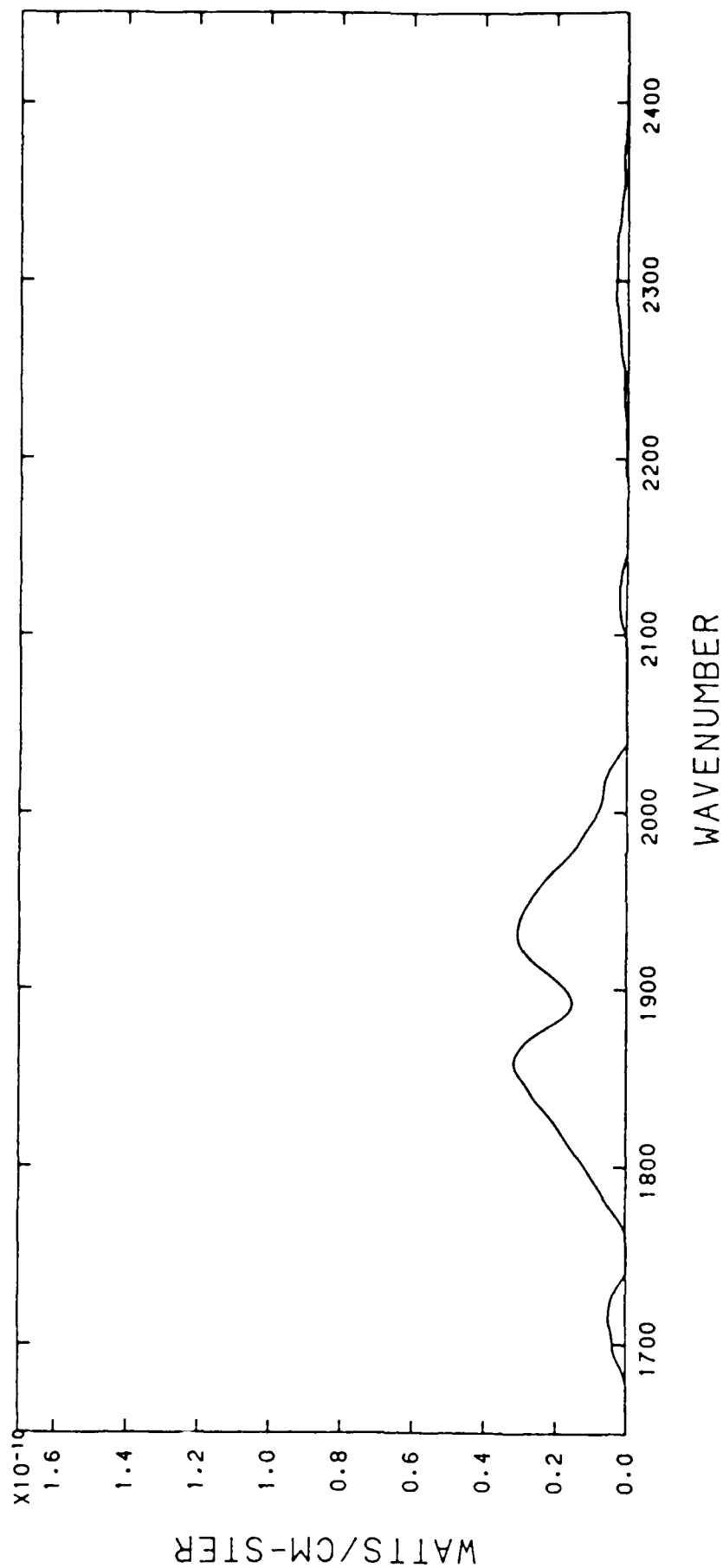


WAVENUMBER

FILE 64, TIME 9: 9:27.132, ALT 139.3-139.3 KM

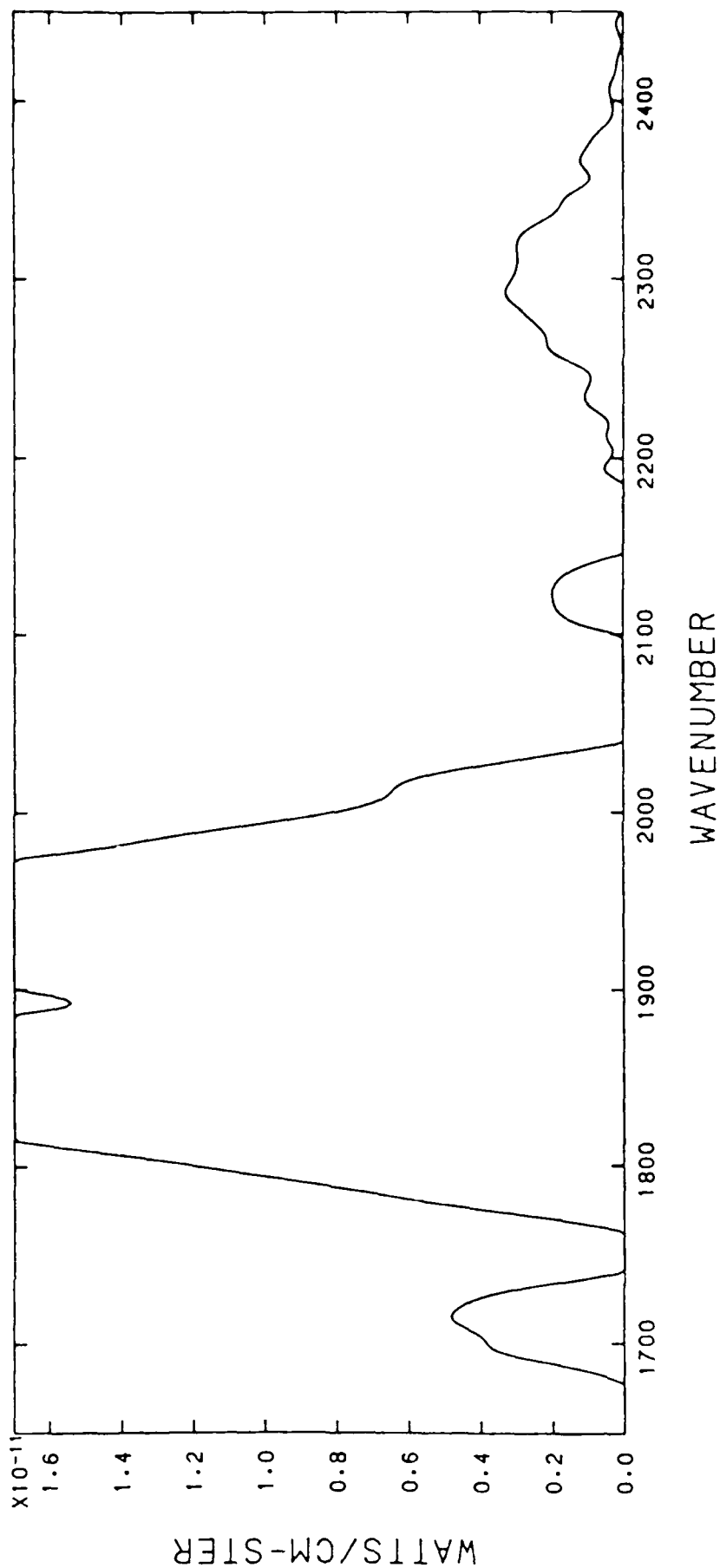
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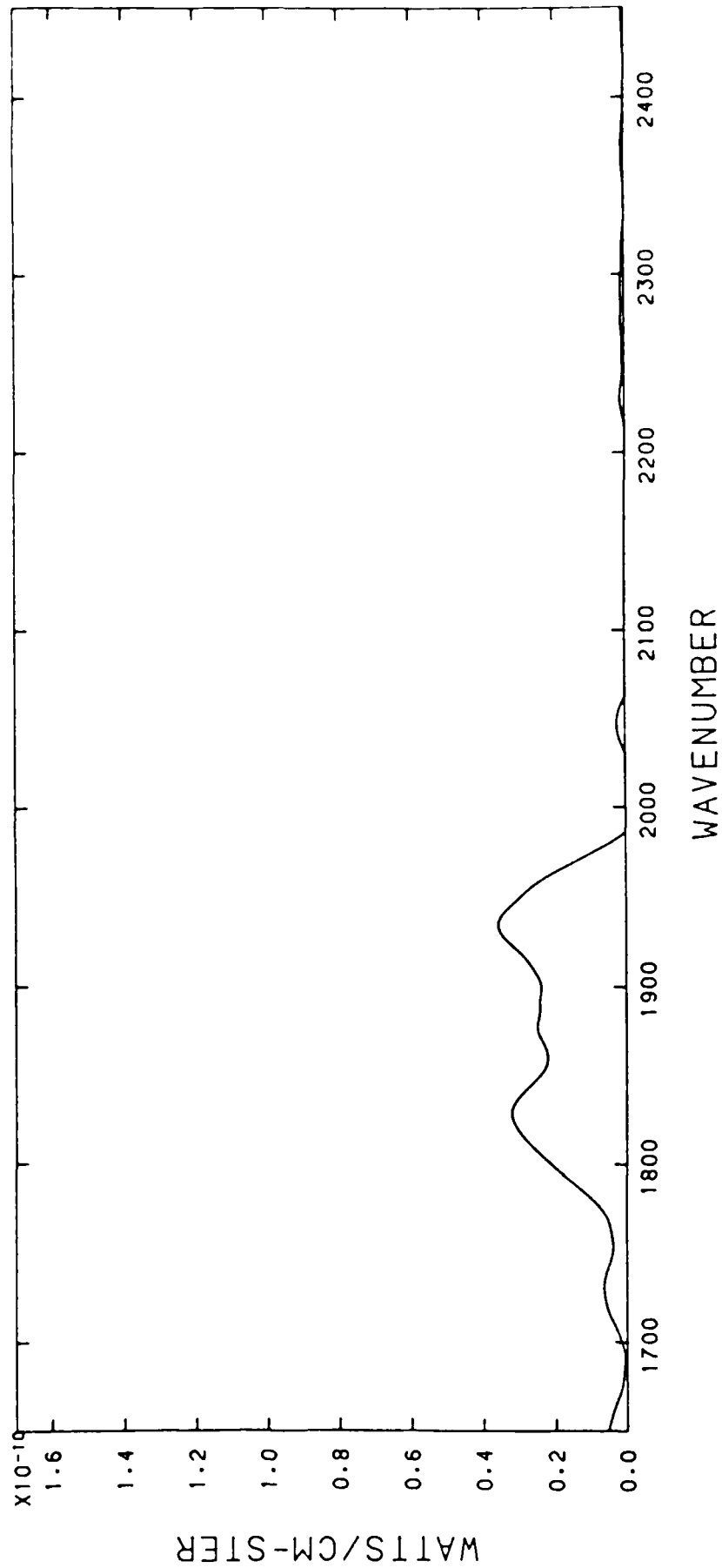


FILE 65, TIME 9: 9:27.632, ALT 139.3-139.3 KM

30-NOV-83 09:30

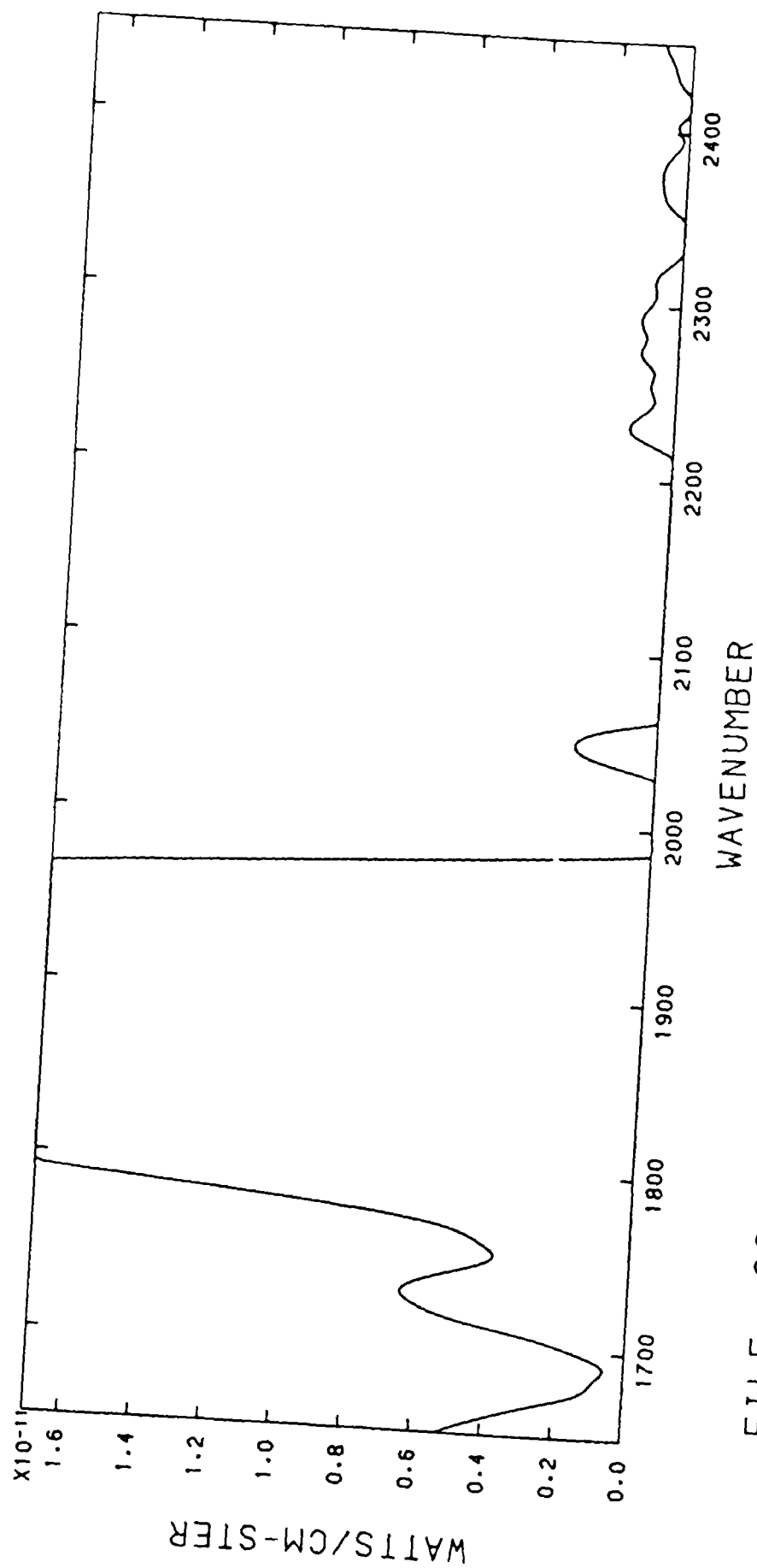


FILE 65, TIME 9: 9:27.632, ALT 139.3-139.3 KM



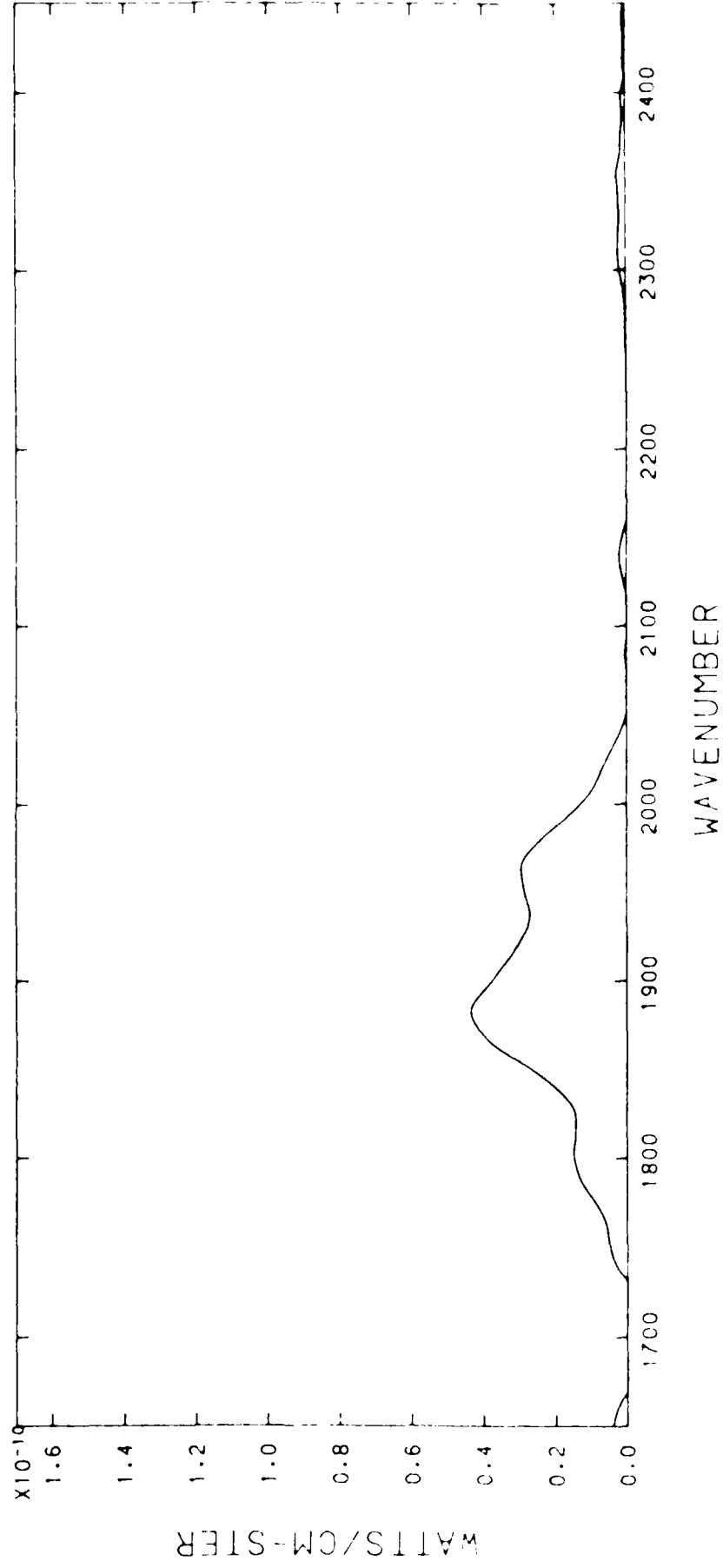
FILE 66, TIME 9: 9:30.424, ALT 139.3-139.3 KM

30-NOV-83 09:30

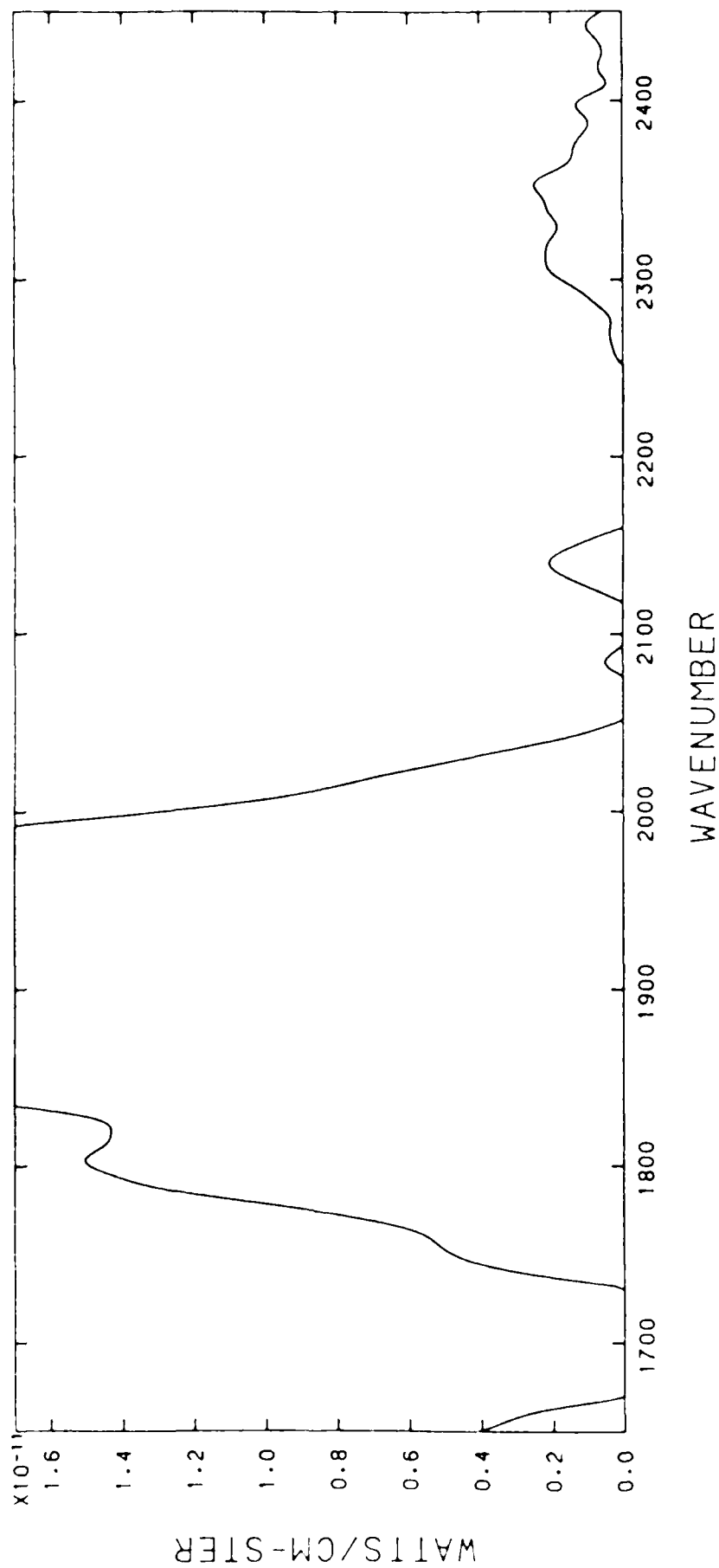


FILE 66, TIME 9: 9:30.424, ALT 139.3-139.3 KM

30-NOV-83 09:30

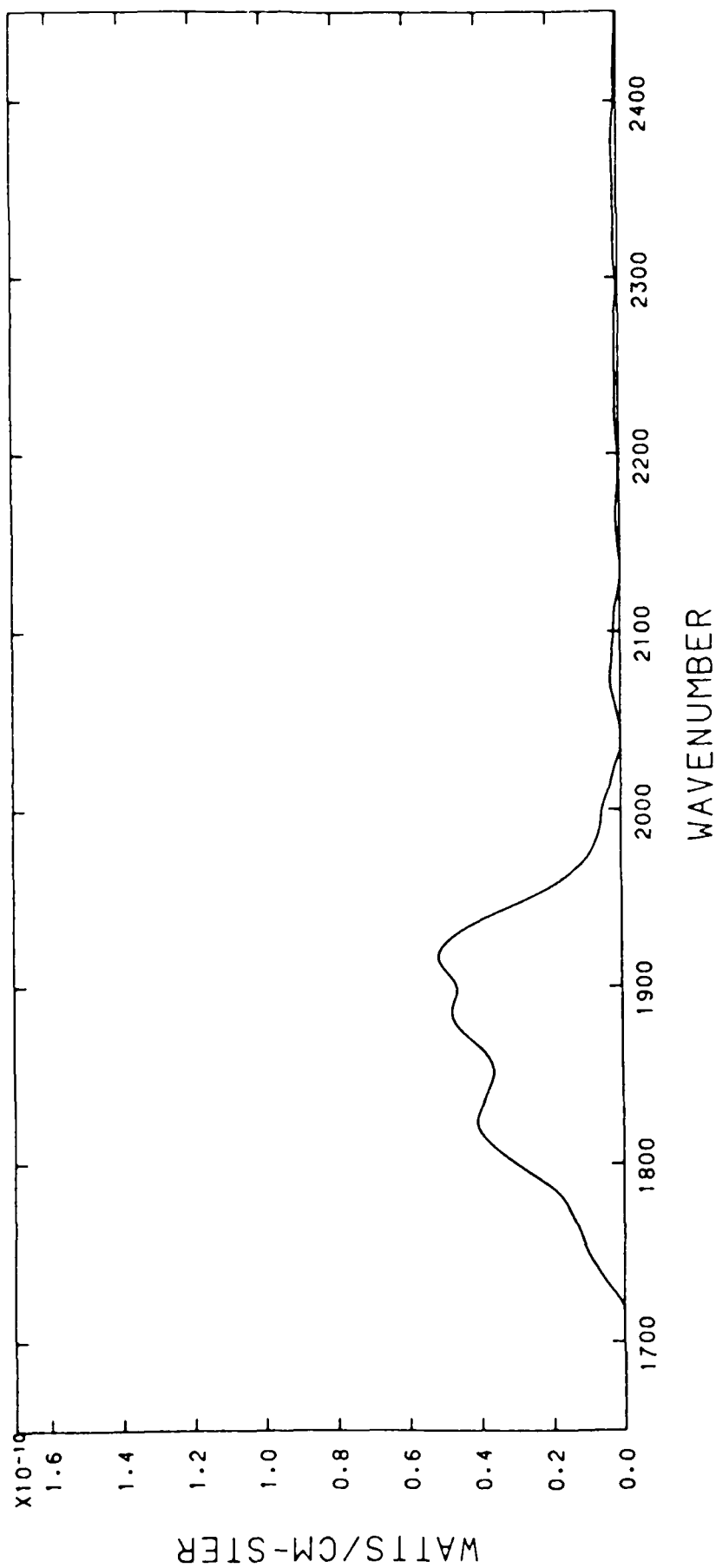


FILE 67. TIME 9: 9:30.926. ALT 139.3-139.3 KM



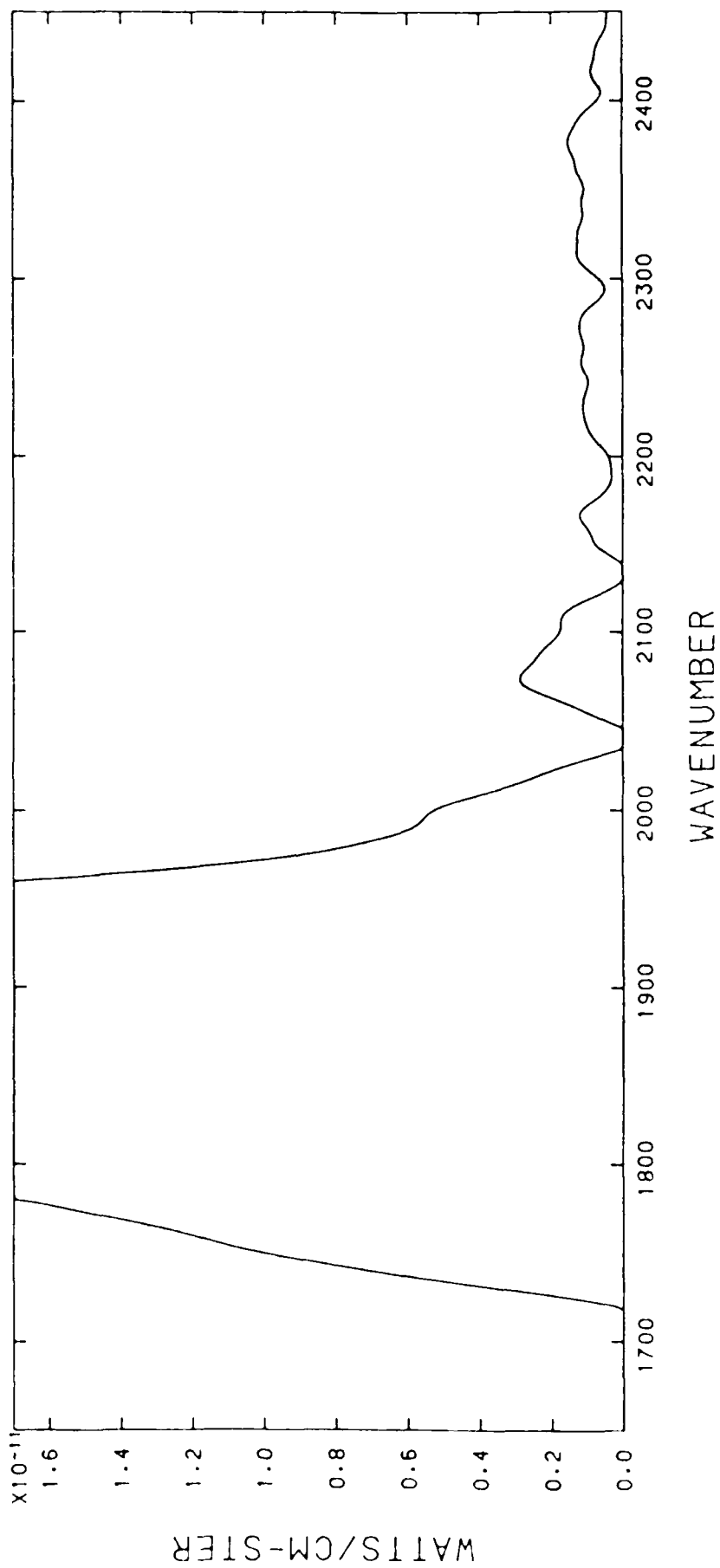
FILE 67, TIME 9: 9:30.926, ALT 139.3-139.3 KM

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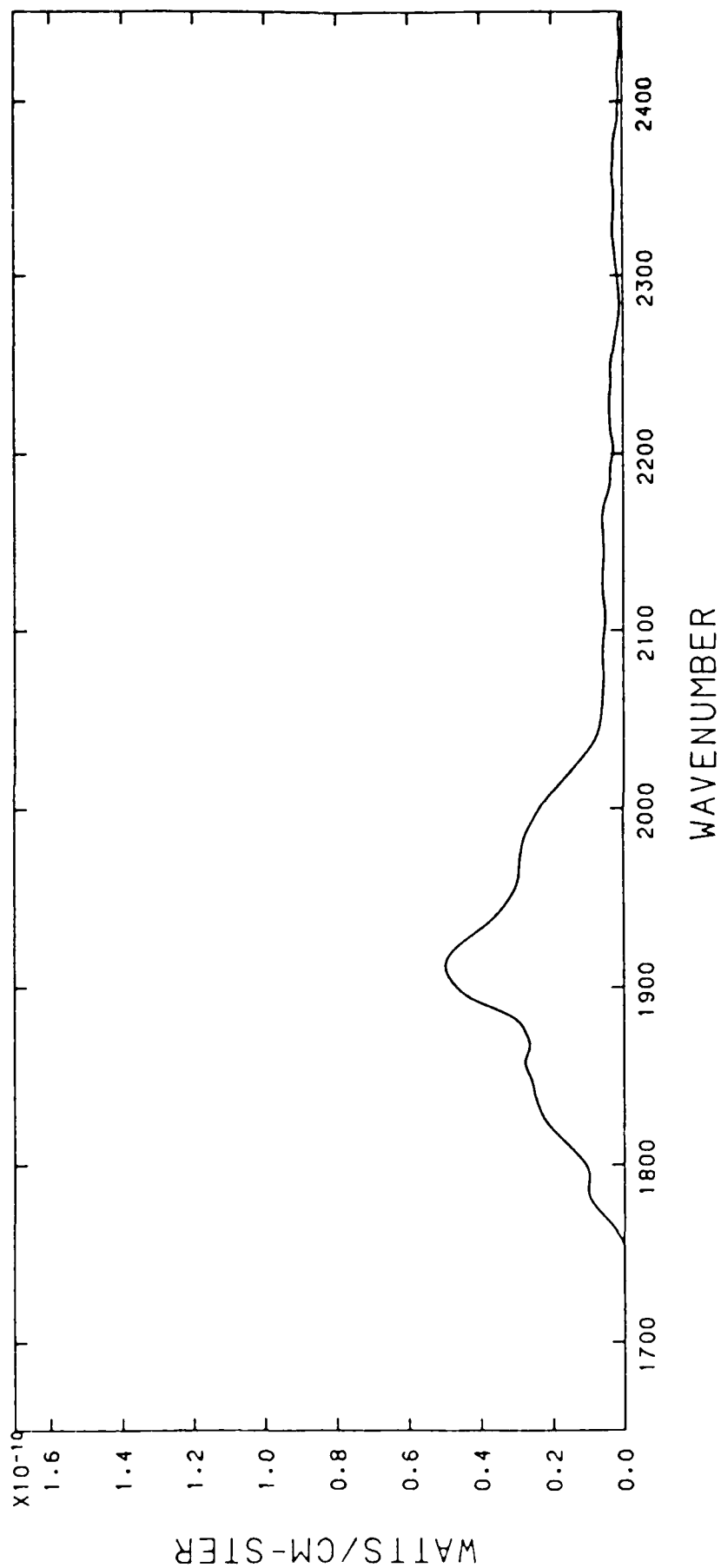
FILE 68. TIME 9: 9:33.704, ALT 139.2-139.2 KM

30-NOV-83 09:30



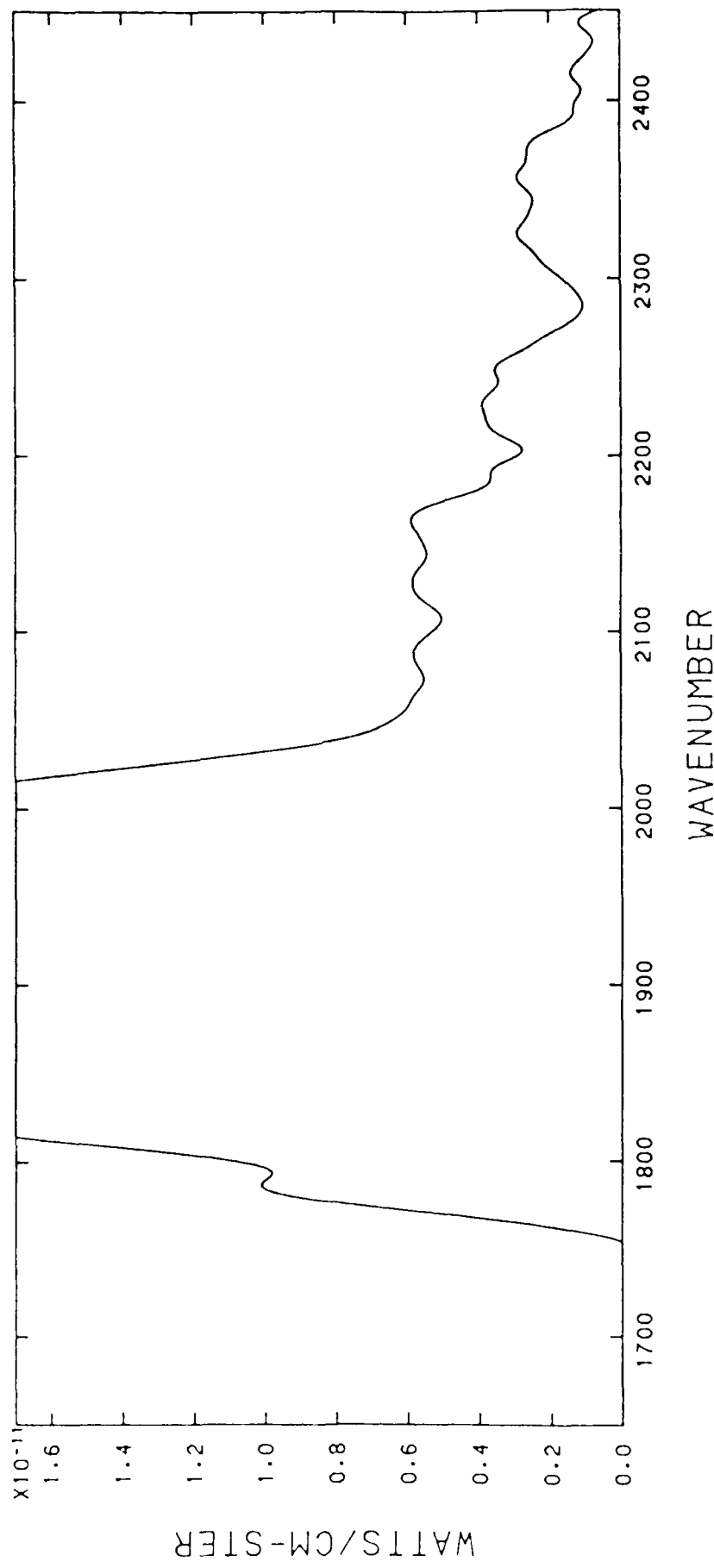
FILE 68, TIME 9: 9:33.704, ALT 139.2-139.2 KM



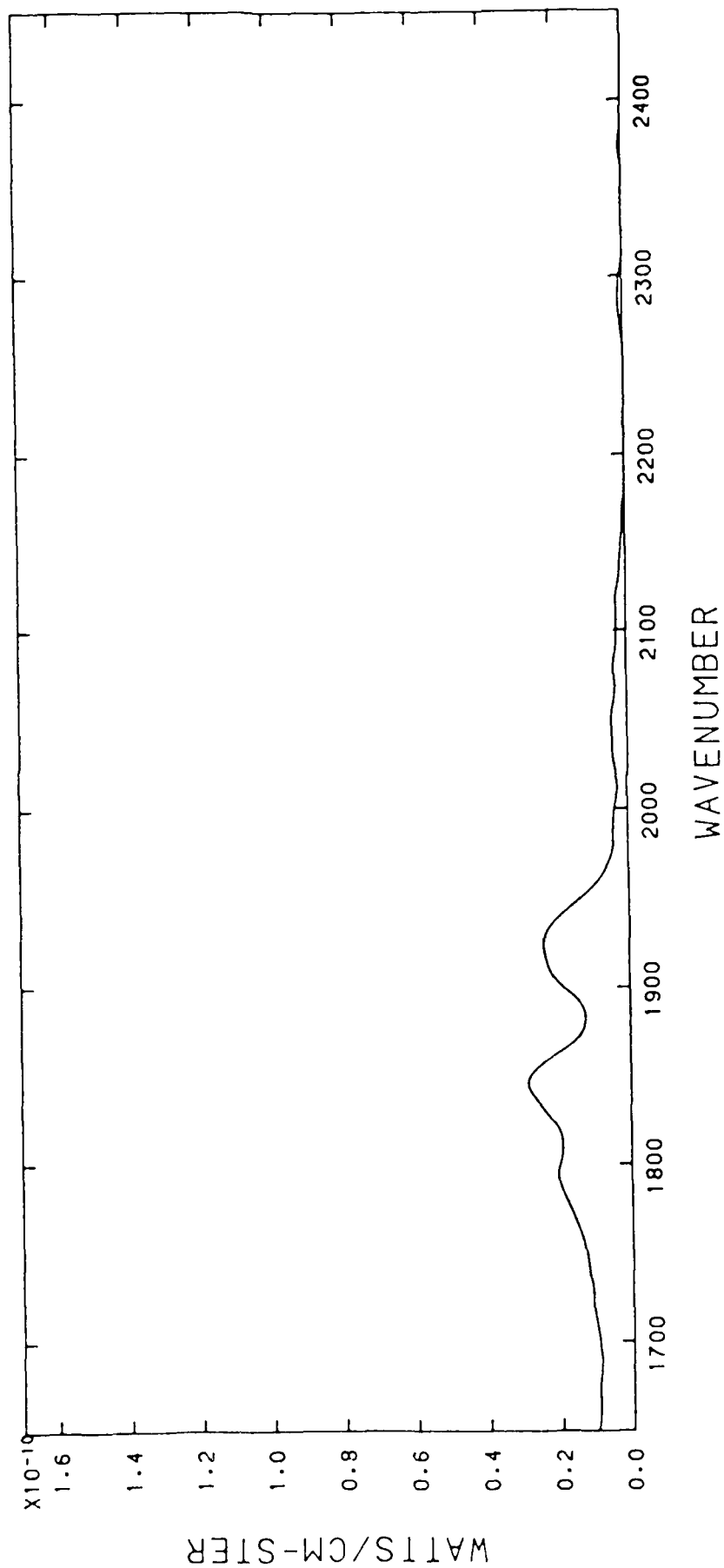


FILE 69, TIME 9: 9:34.210, ALT 139.2-139.2 KM

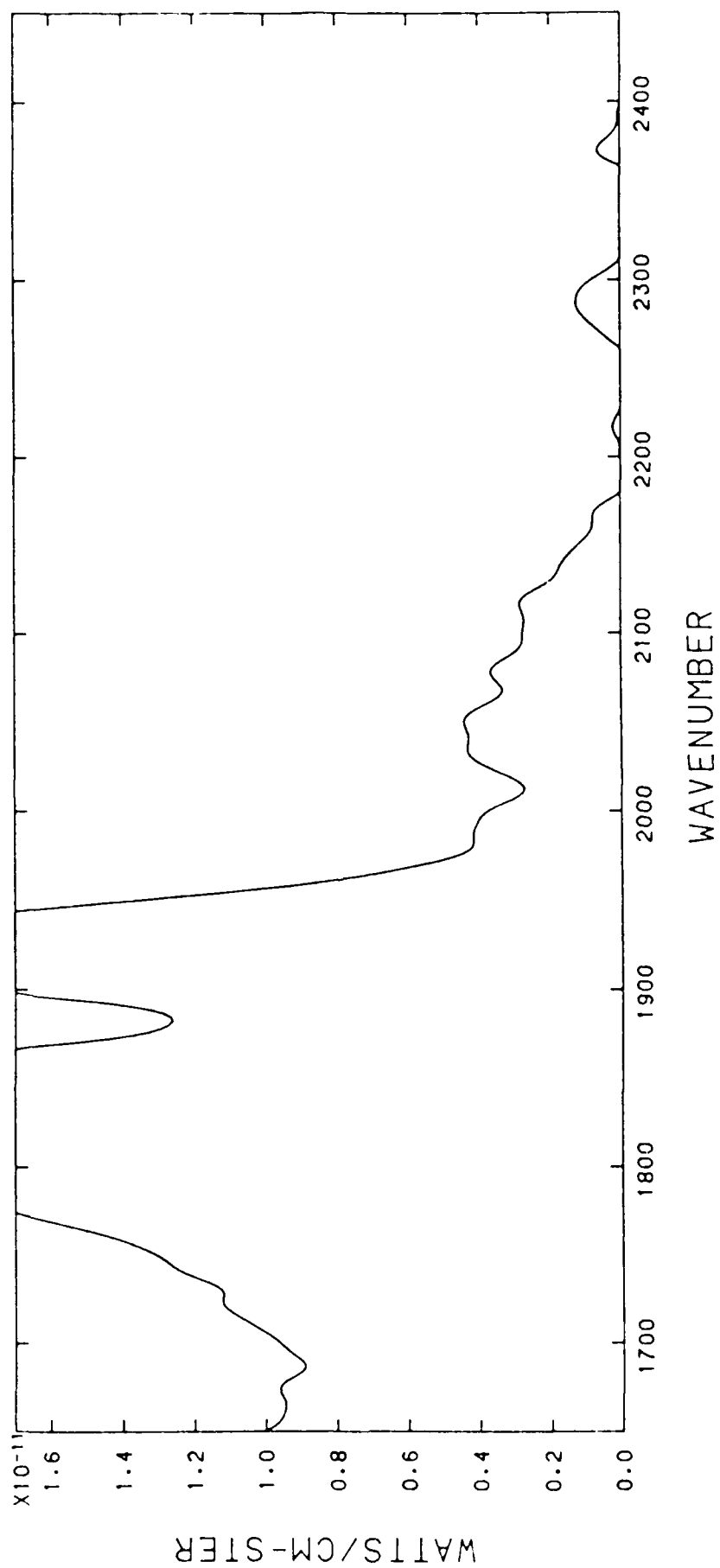
30-NOV-83 09:30



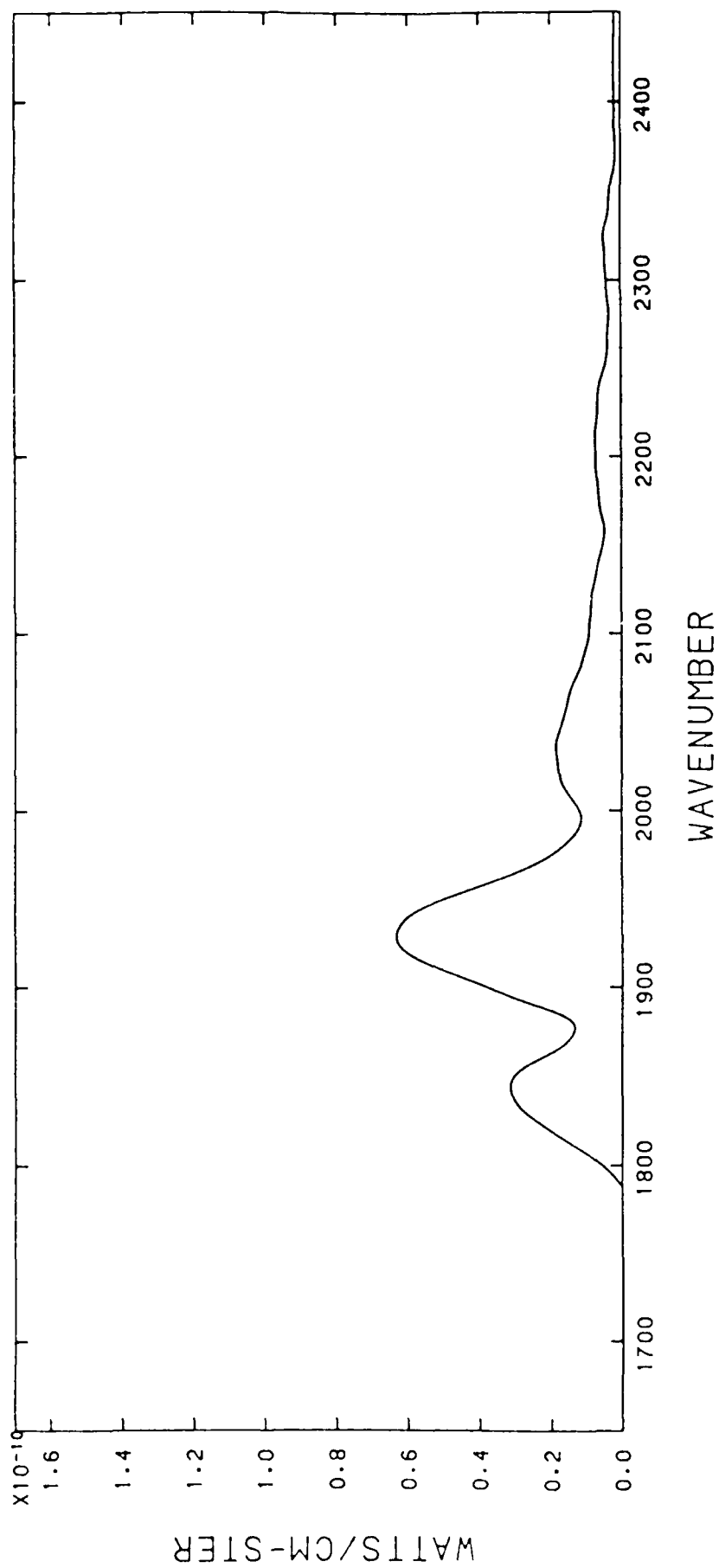
FILE 69, TIME 9: 9:34.210, ALT 139.2-139.2 KM



FILE 70, TIME 9: 9:36.998, ALT 139.1-139.1 KM

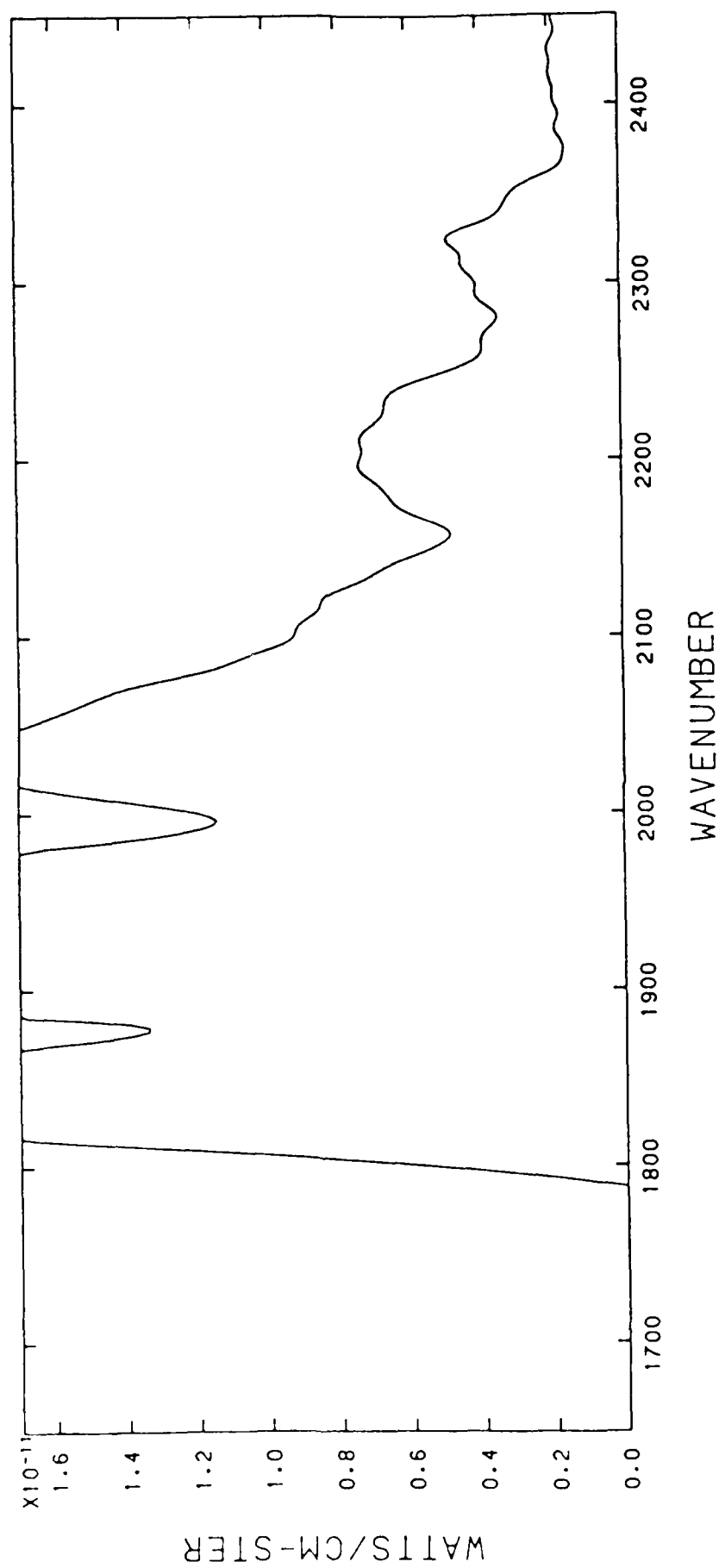


FILE 70, TIME 9: 9:36.998, ALT 139.1-139.1 KM

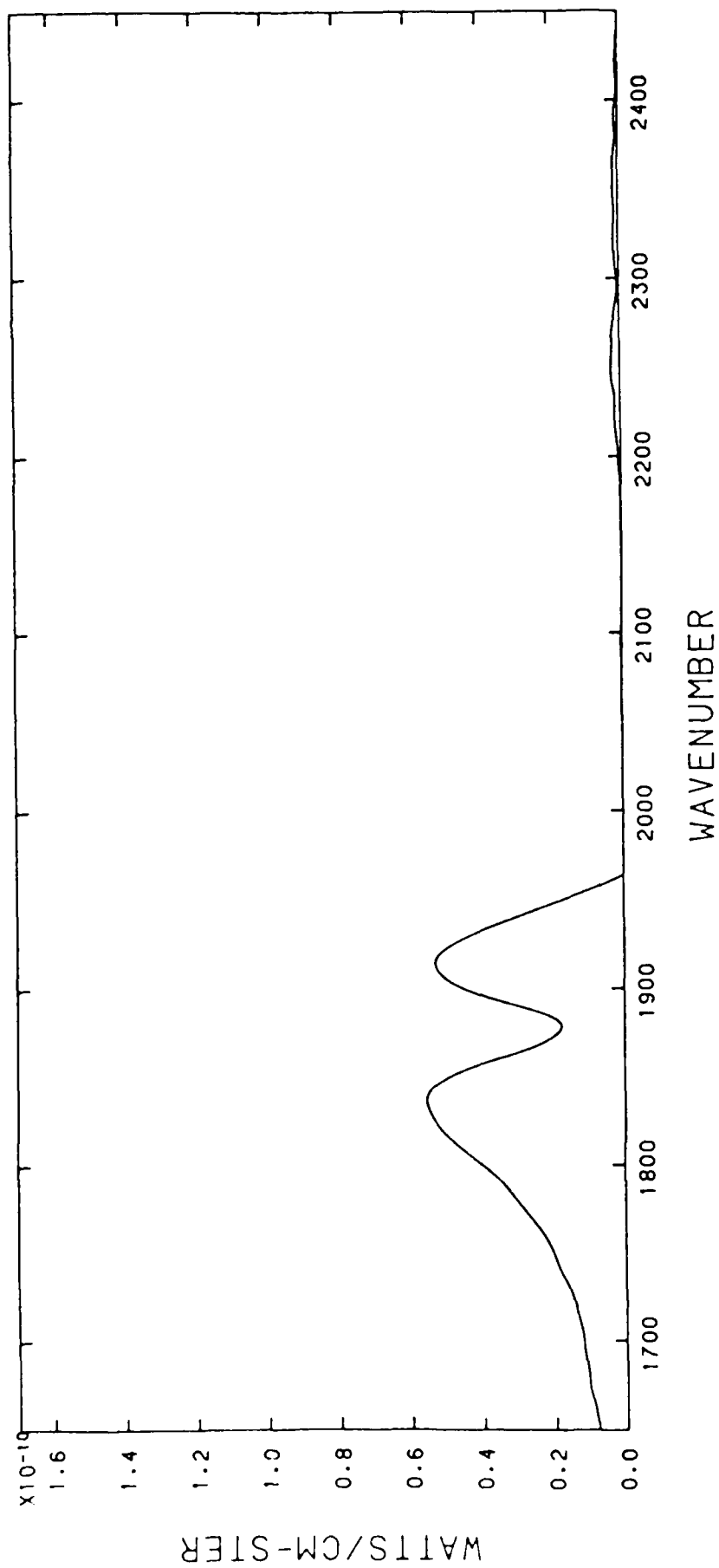


FILE 71, TIME 9: 9:37.502, ALT 139.0-139.0 KM

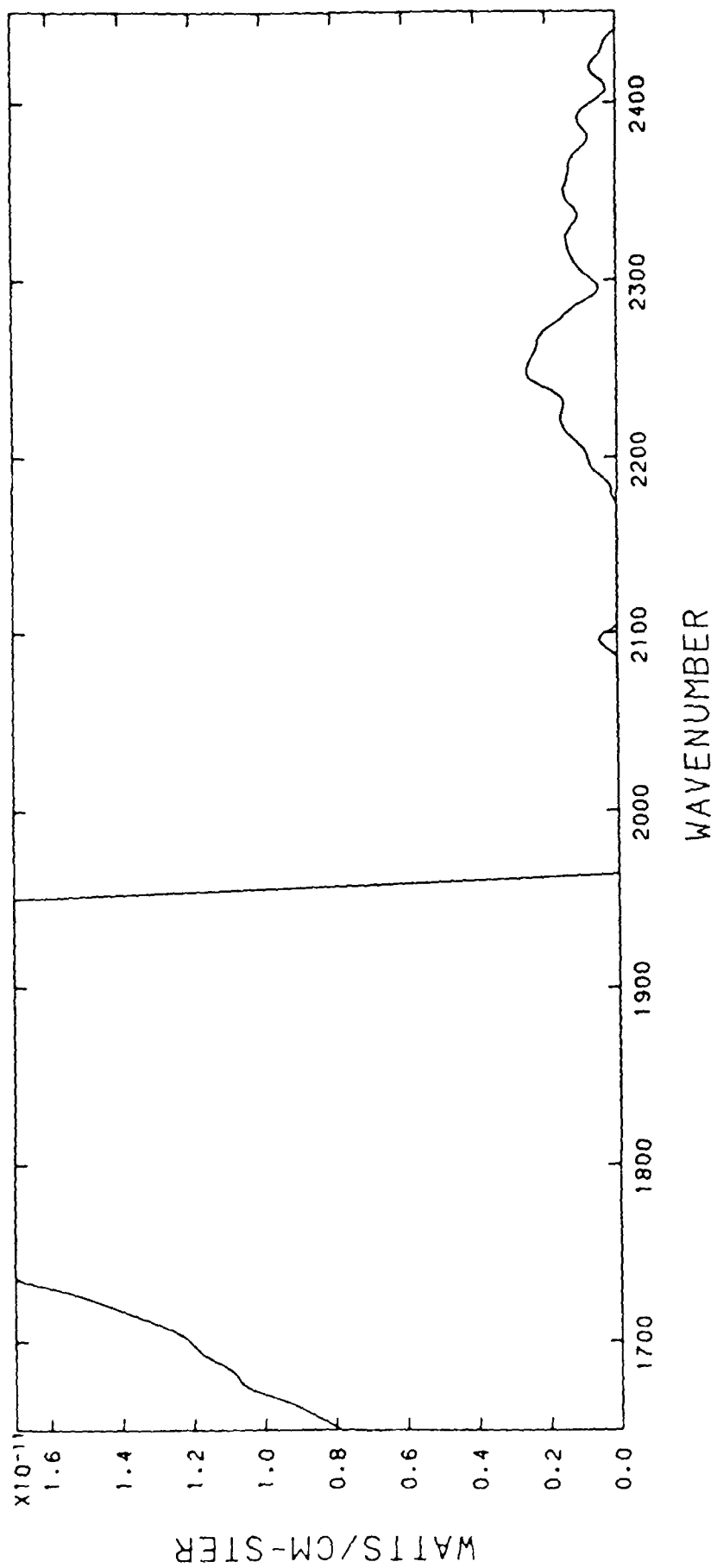
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FILE 71, TIME 9: 9:37.502, ALT 139.0-139.0 KM

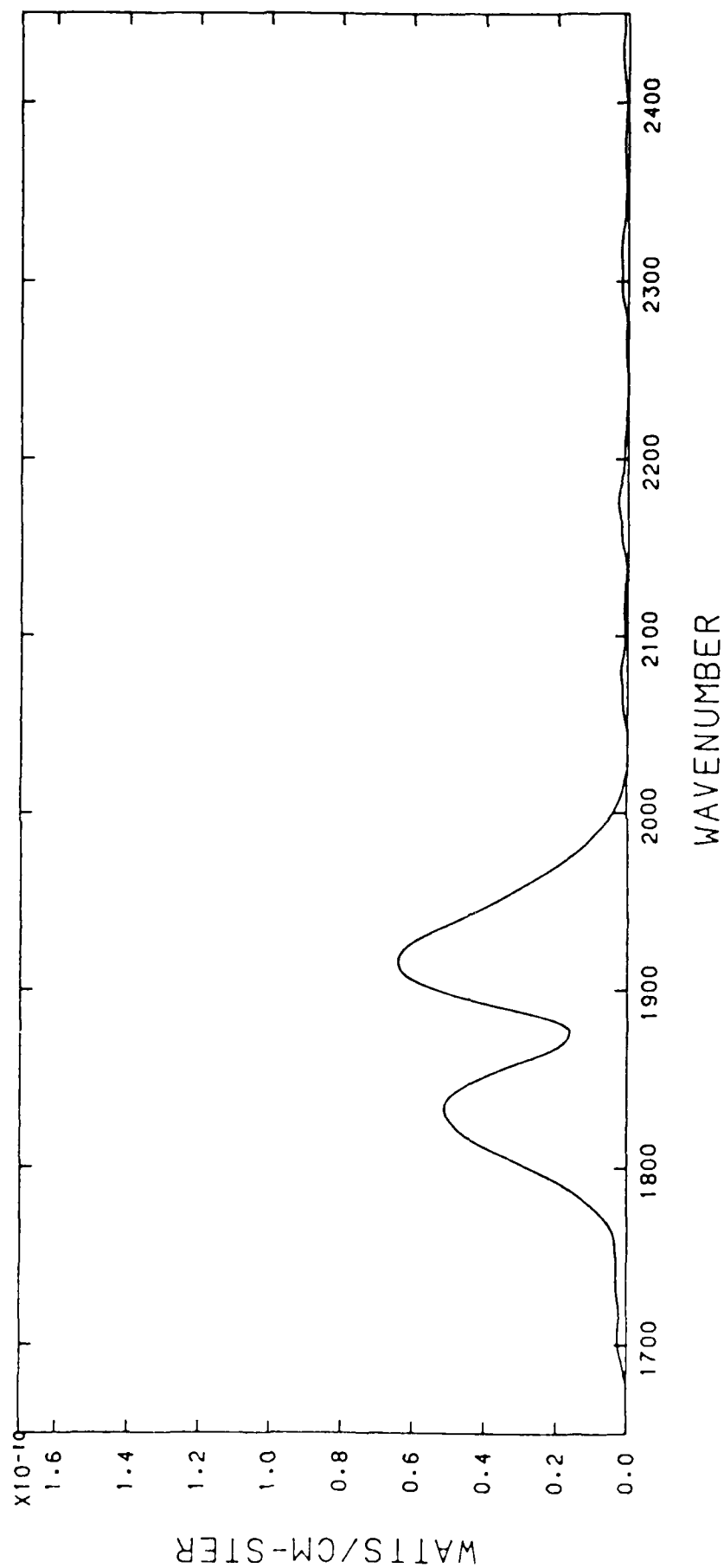


FILE 72, TIME 9: 9:40.278, ALT 138.8-138.8 KM



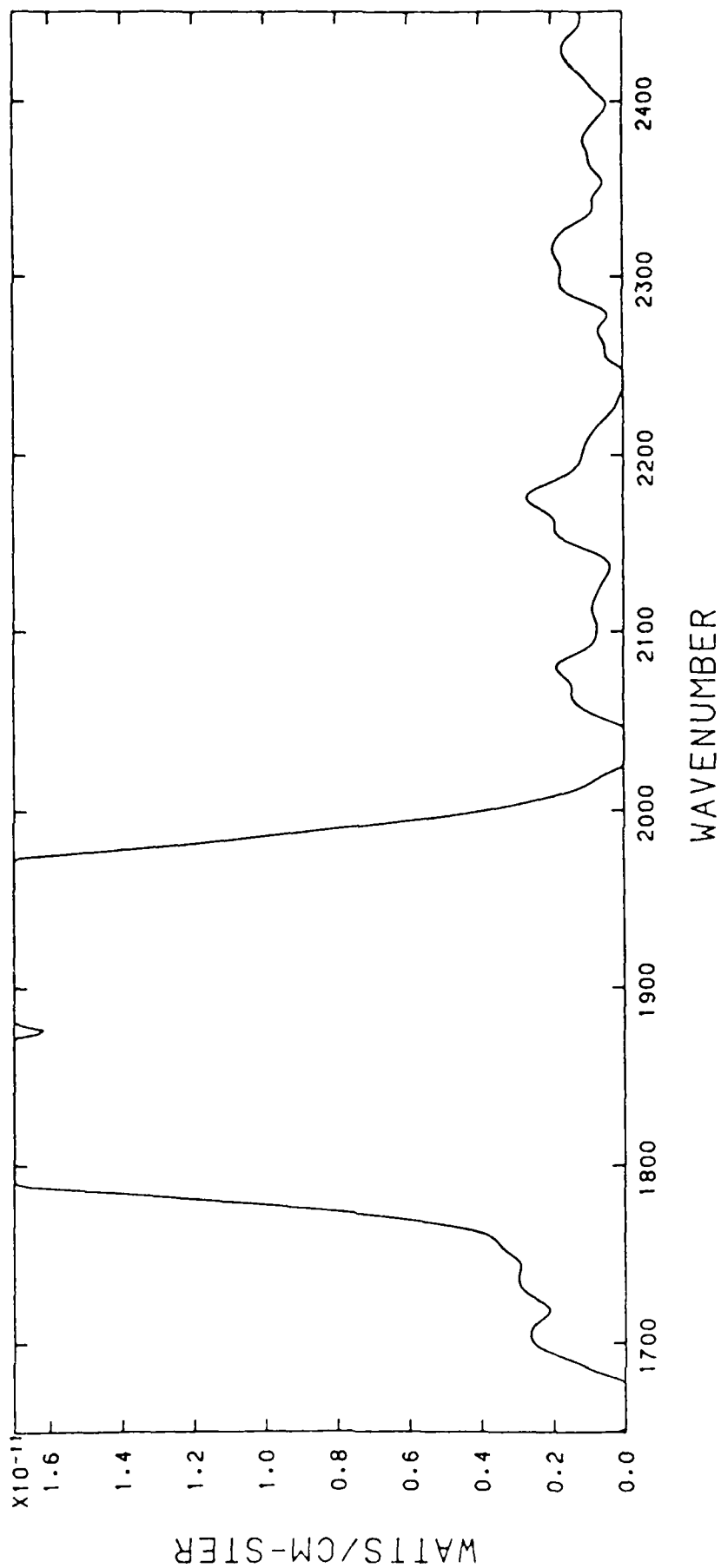
FILE 72, TIME 9: 9:40.278, ALT 138.8-138.8 KM



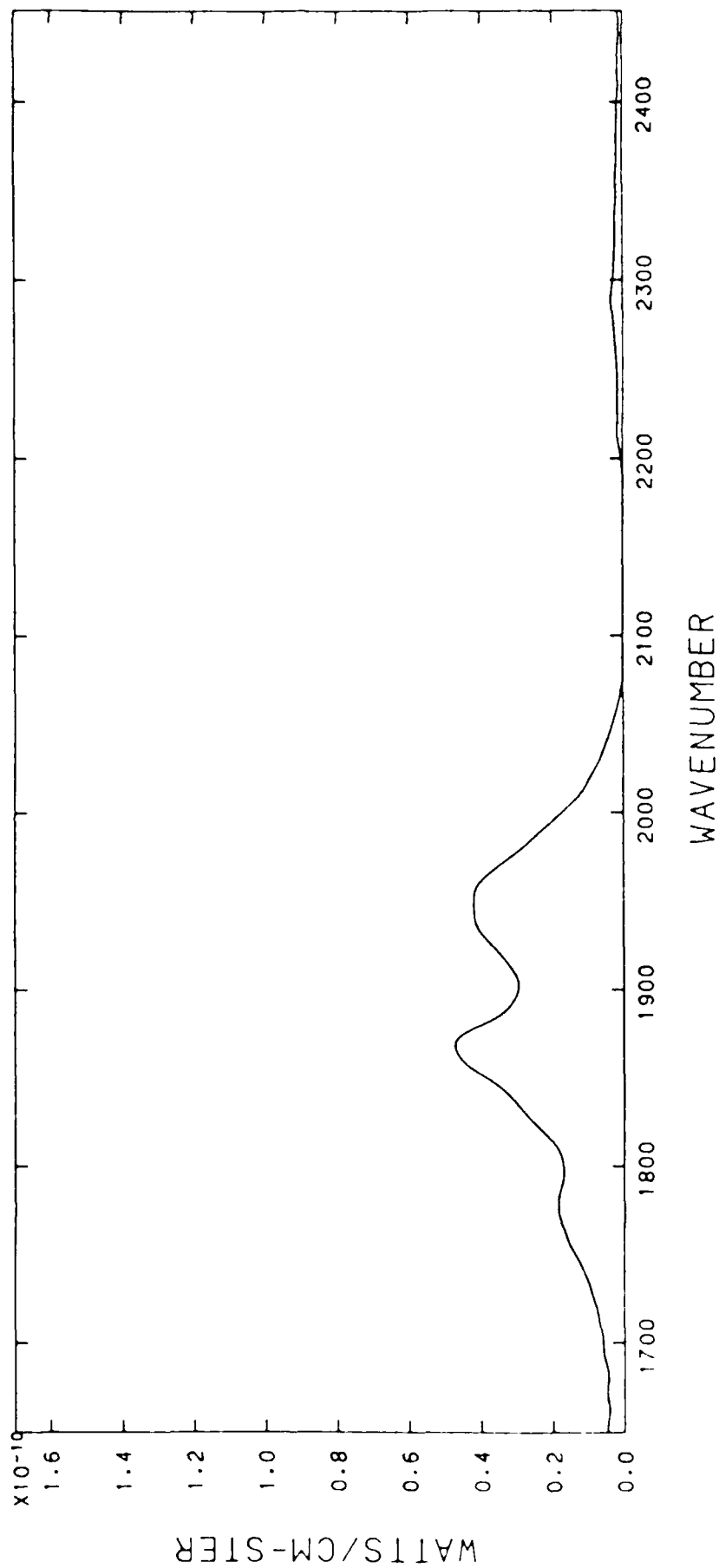


FILE 73, TIME 9: 9:40.774, ALT 138.8-138.7 KM

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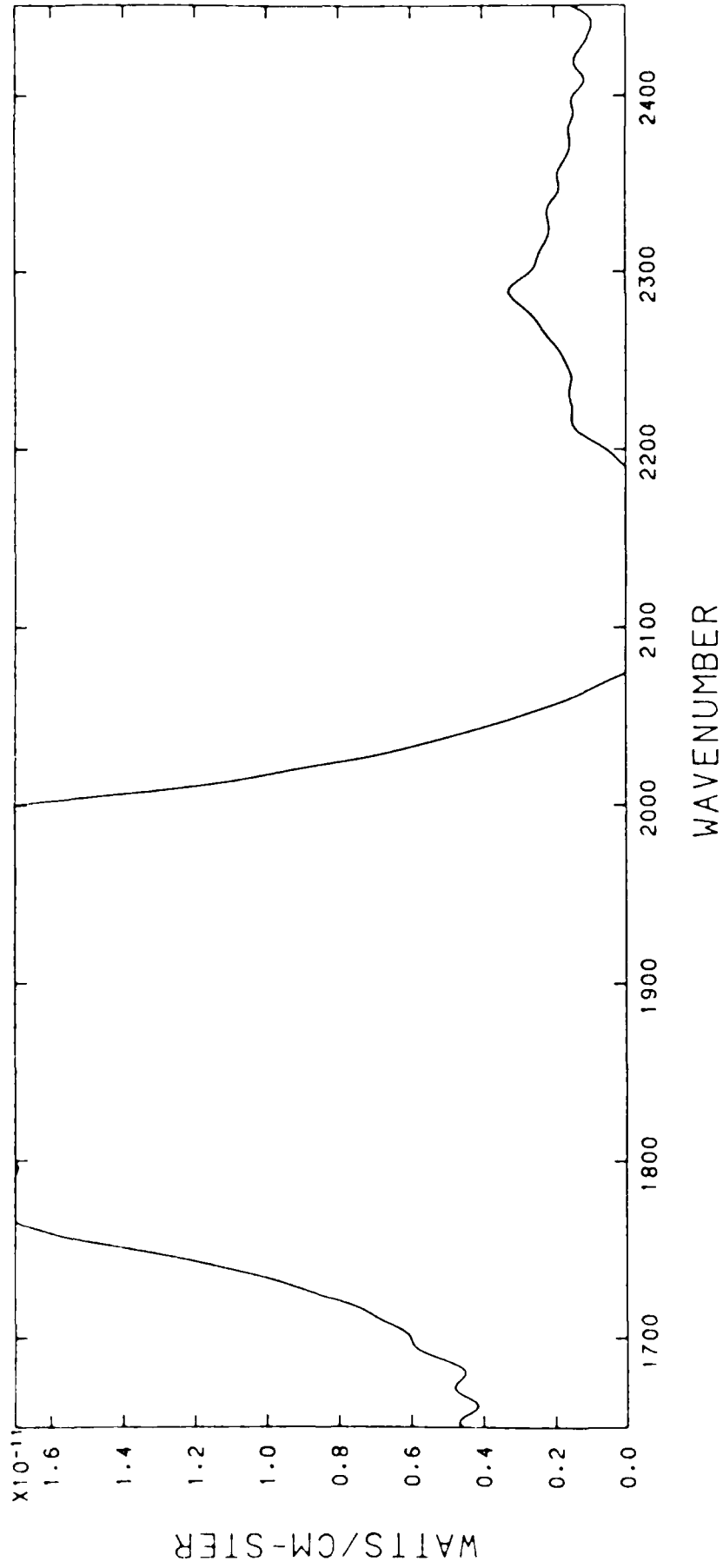


FILE 73, TIME 9: 9:40.774, ALT 138.8-138.7 KM

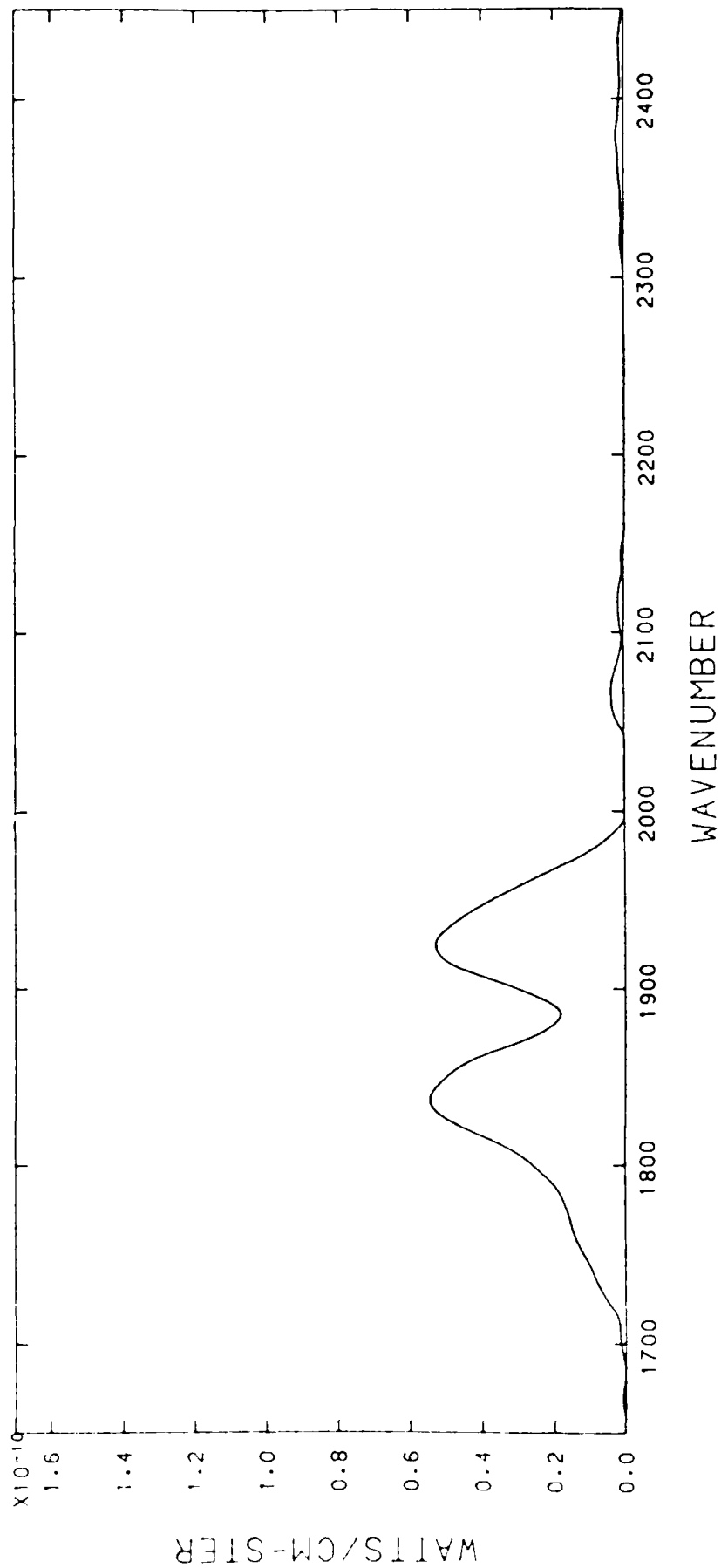


FILE 74, TIME 9: 9:43.554, ALT 138.5-138.4 KM

30-MAY-83 09:31

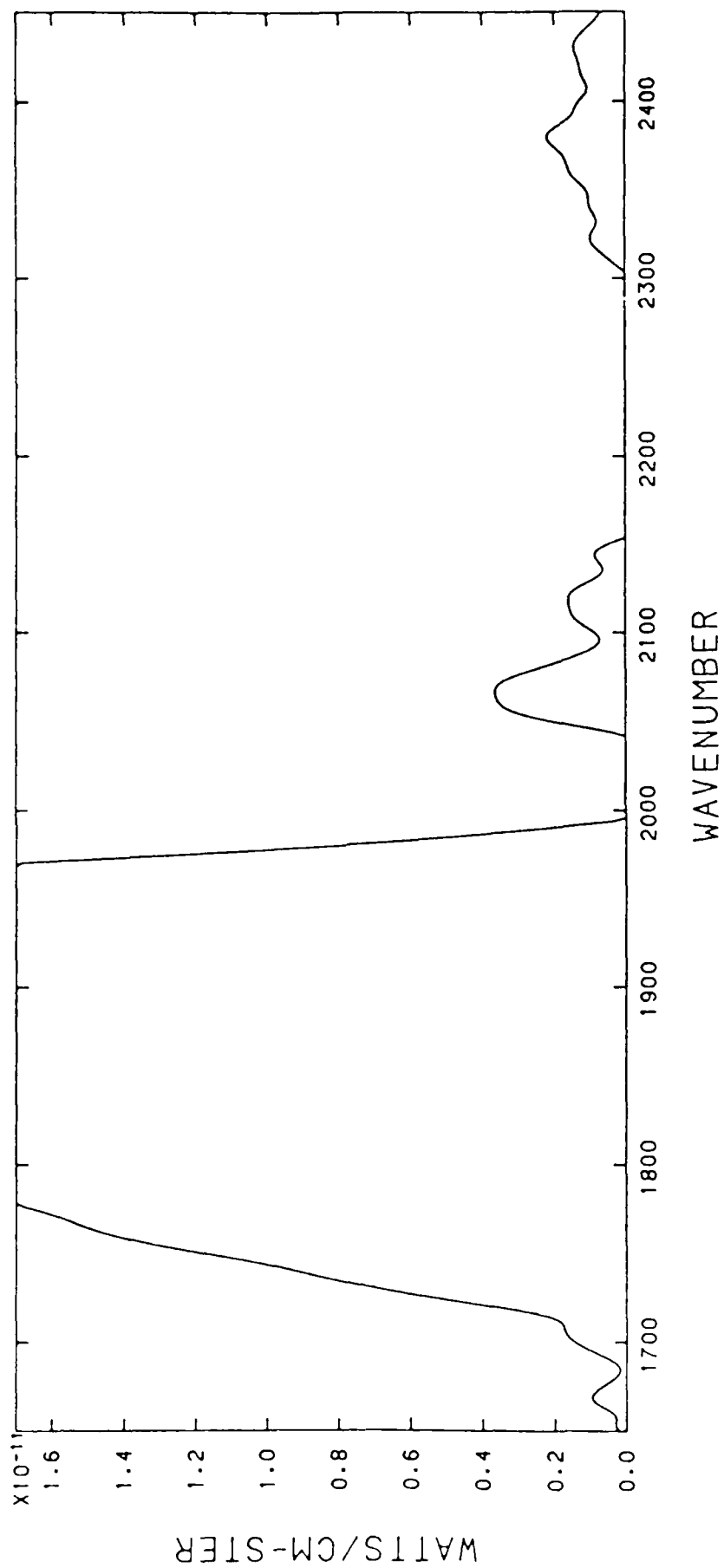


FILE 74, TIME 9: 9:43.554, ALT 138.5-138.4 KM

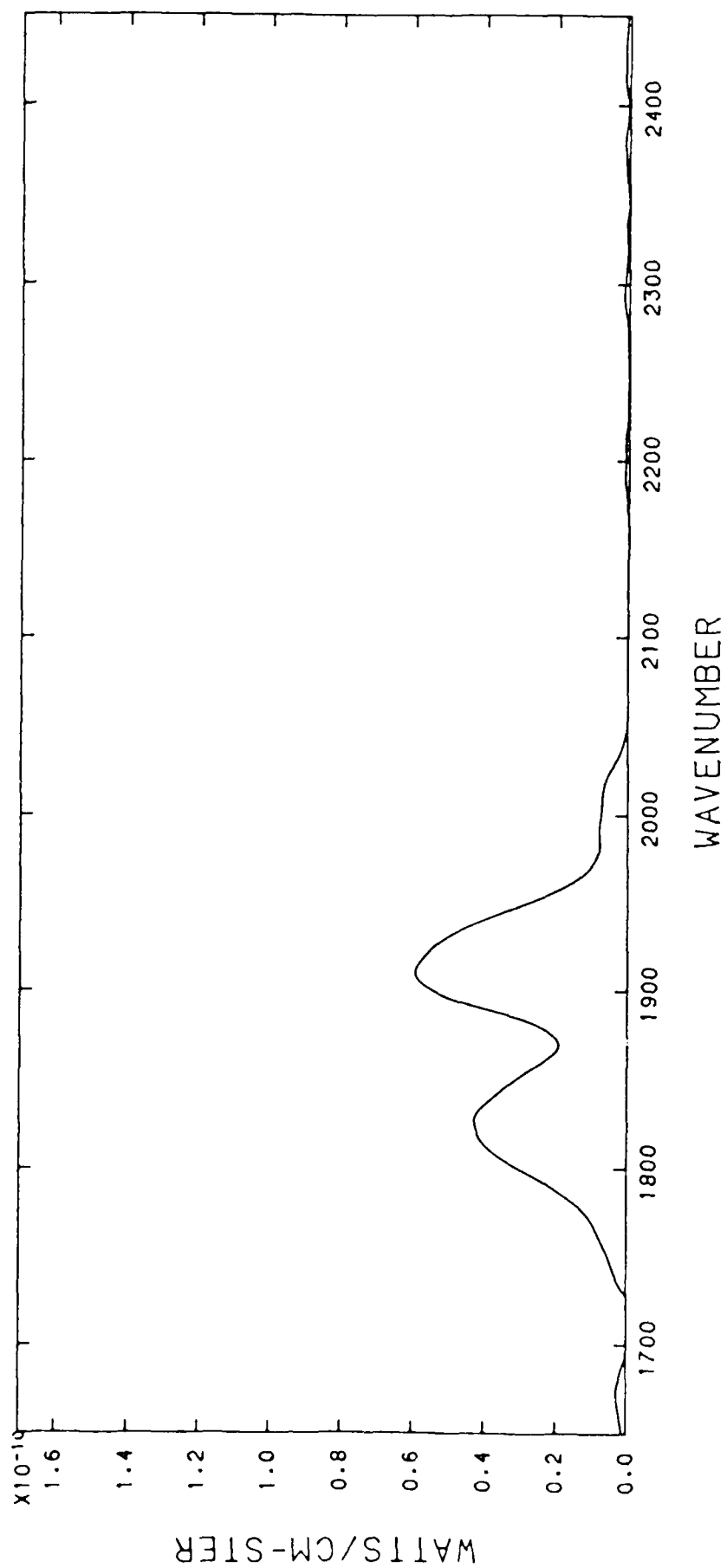


FILE 75, TIME 9: 9:44. 54, ALT 138.4-138.3 KM

30-NOV-83 09:31

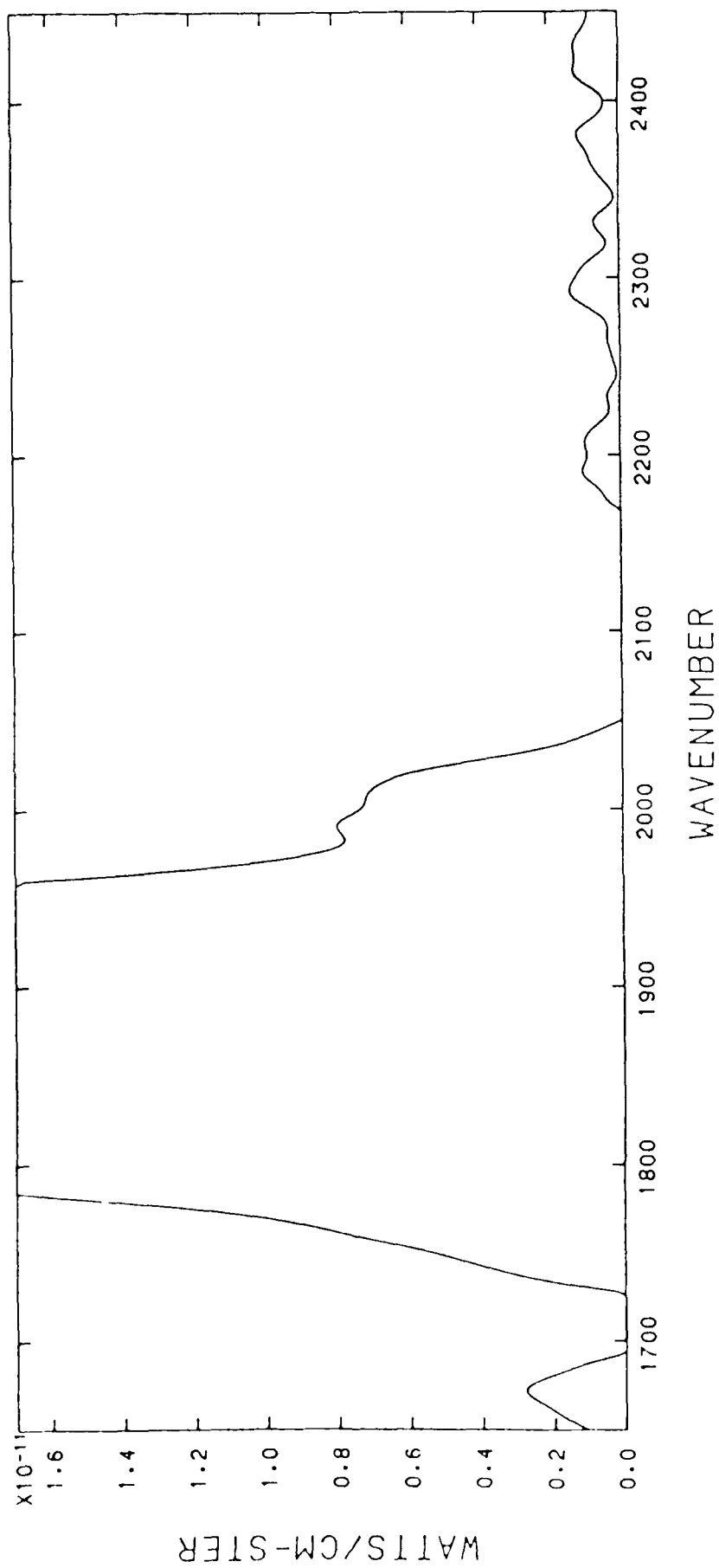


FILE 75, TIME 9: 9:44. 54, ALT 138.4-138.3 KM



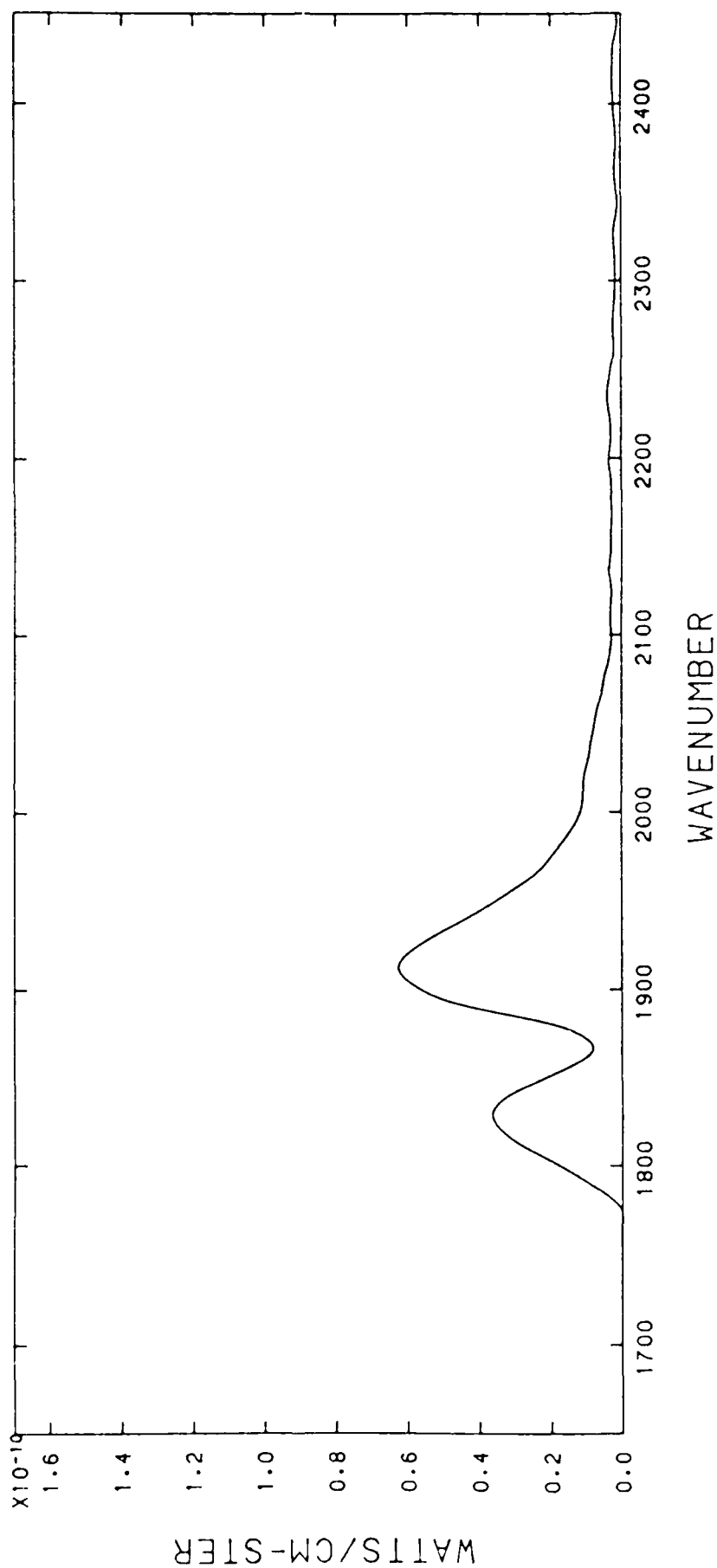
FILE 76, TIME 9: 9:46.822, ALT 138.0-137.9 KM

30-NOV-83 09:31



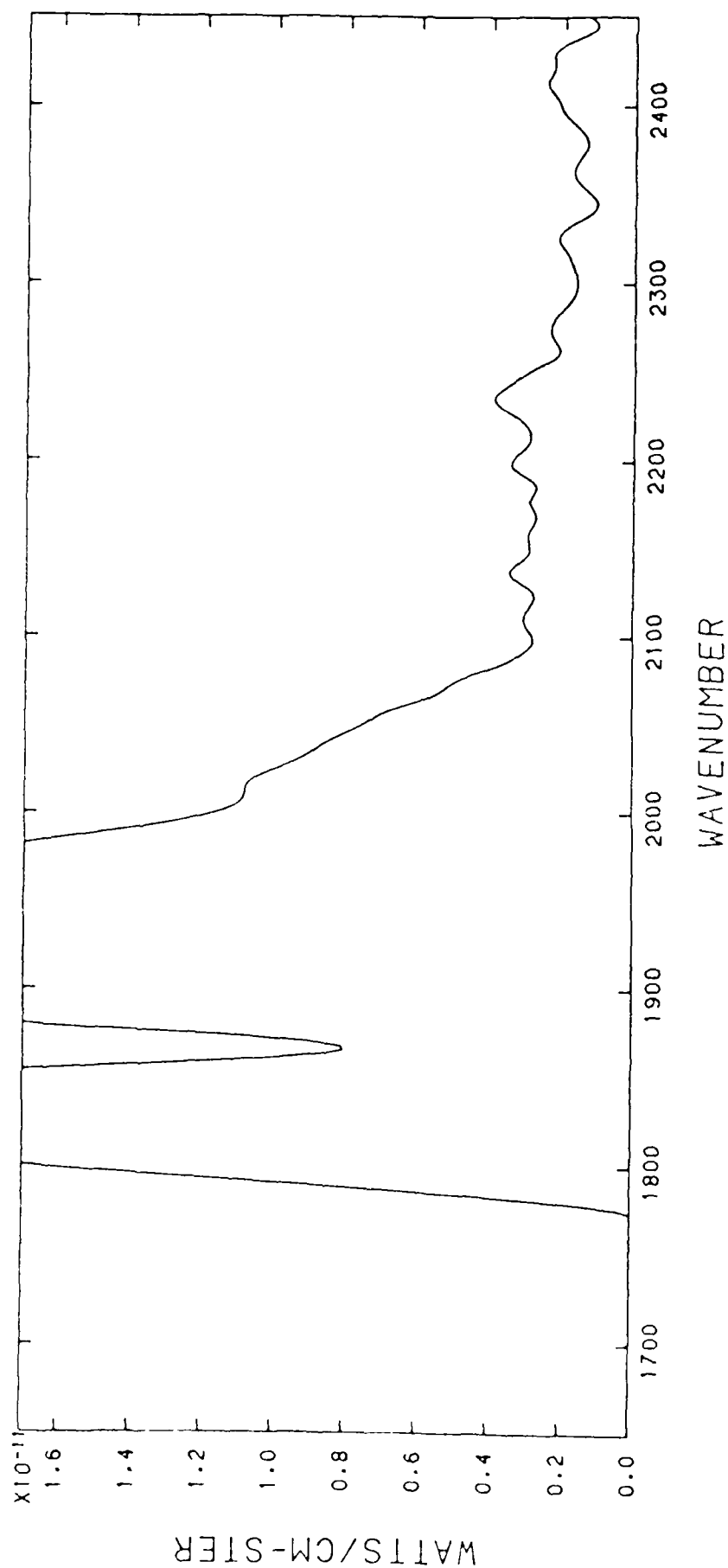
FILE 76, TIME 9: 9:46.822, ALT 138.0-137.9 KM



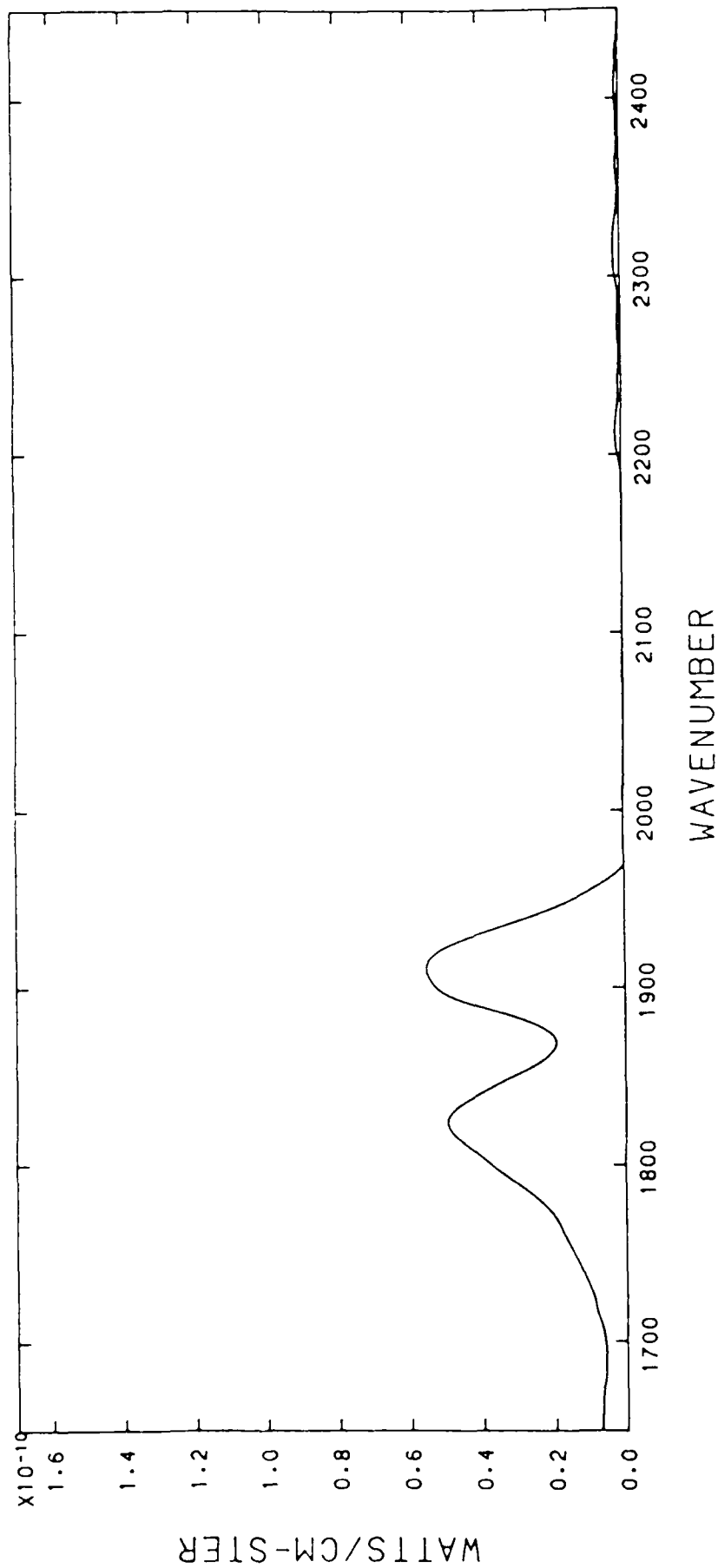


FILE 77, TIME 9: 9:47.320, ALT 137.9-137.9 KM

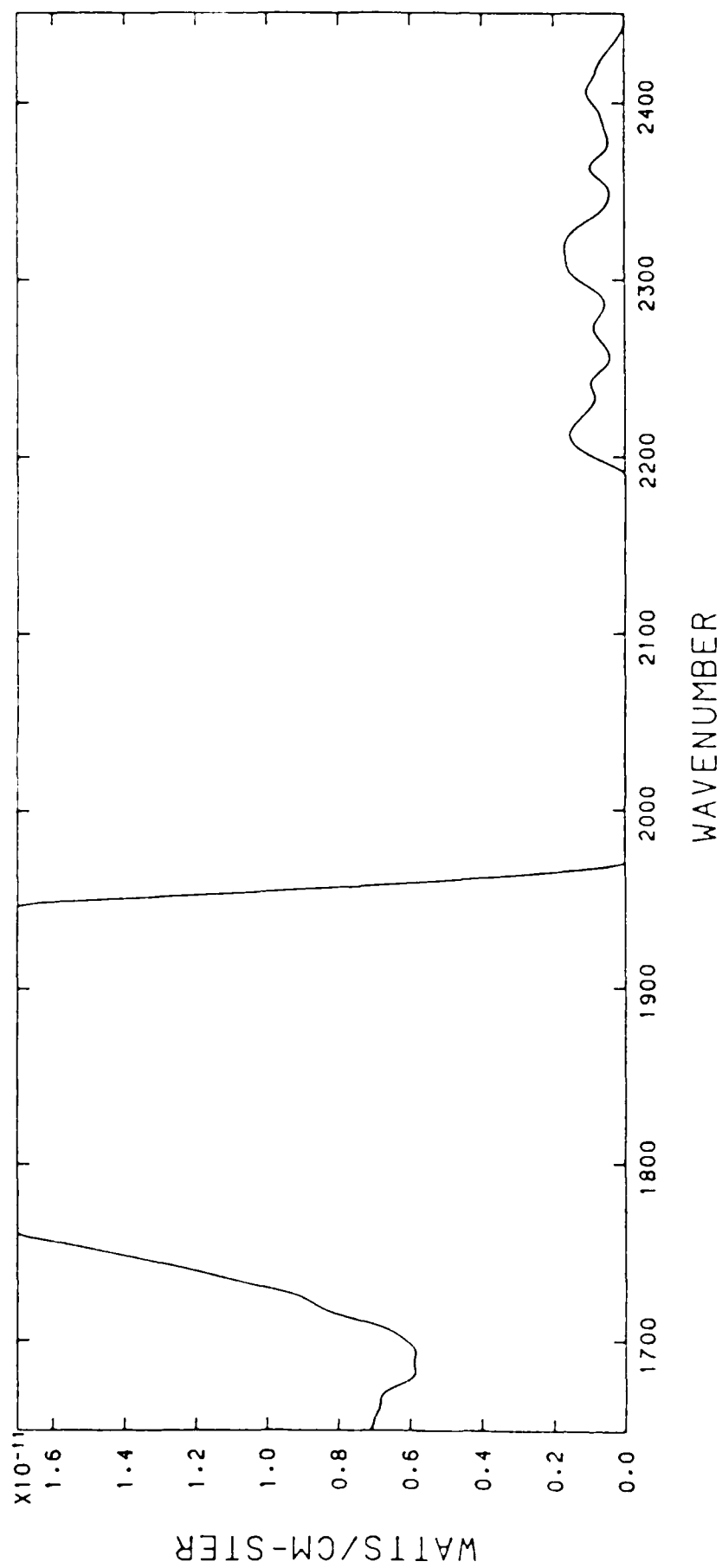
30-NOV-83 09:31



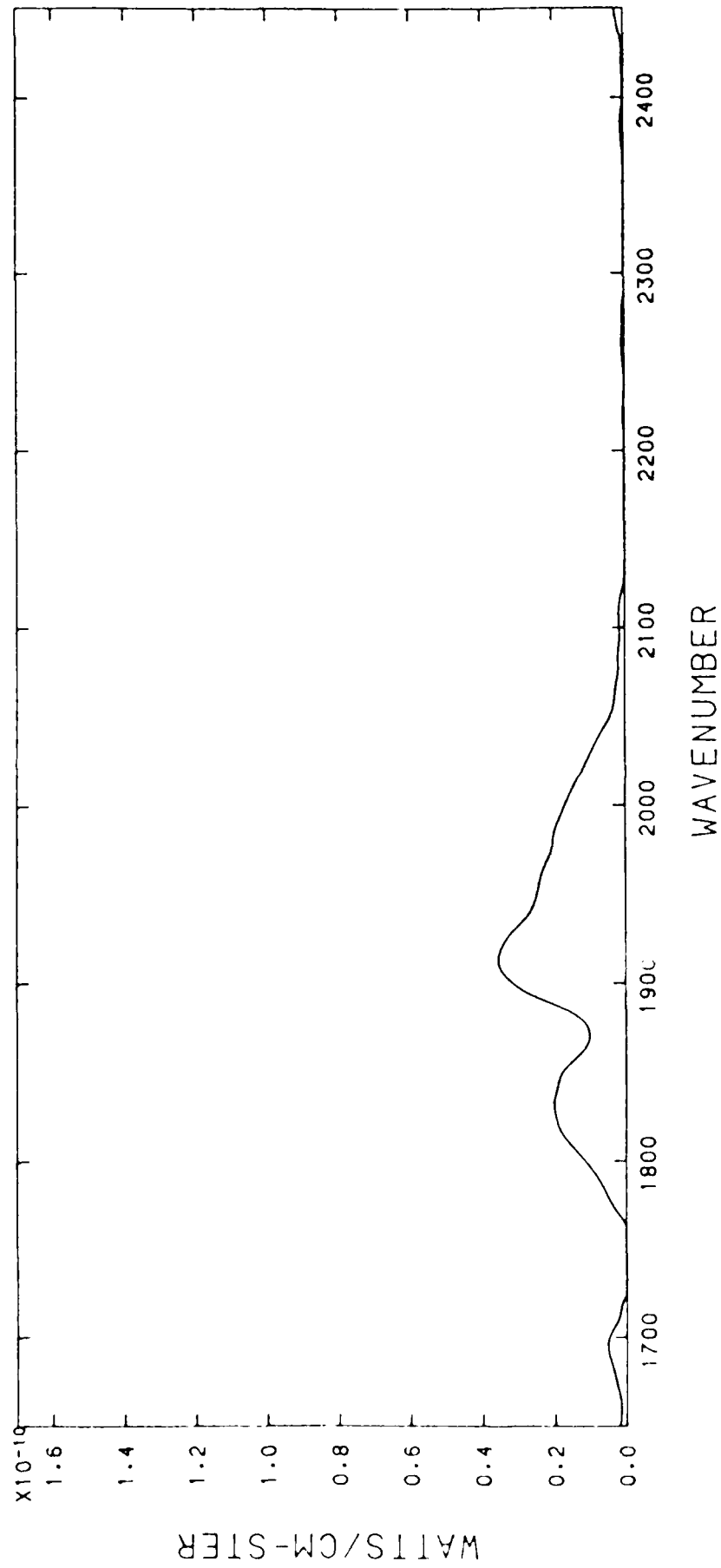
FILE 77, TIME 9: 9:47.320, ALT 137.9-137.9 KM



FILE 78, TIME 9: 9:50. 92, ALT 137.4-137.4 KM

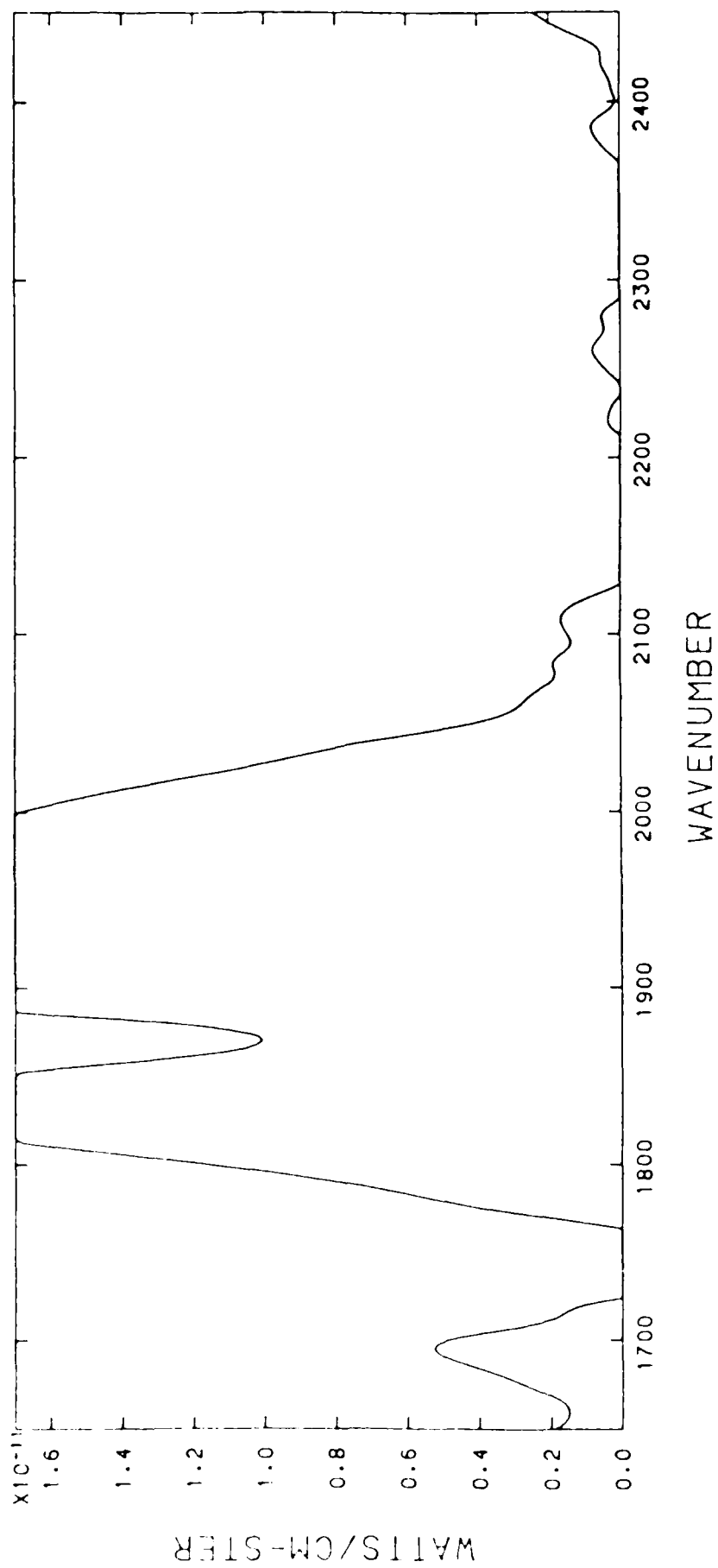


FILE 78, TIME 9: 9:50. 92, ALT 137.4-137.4 KM

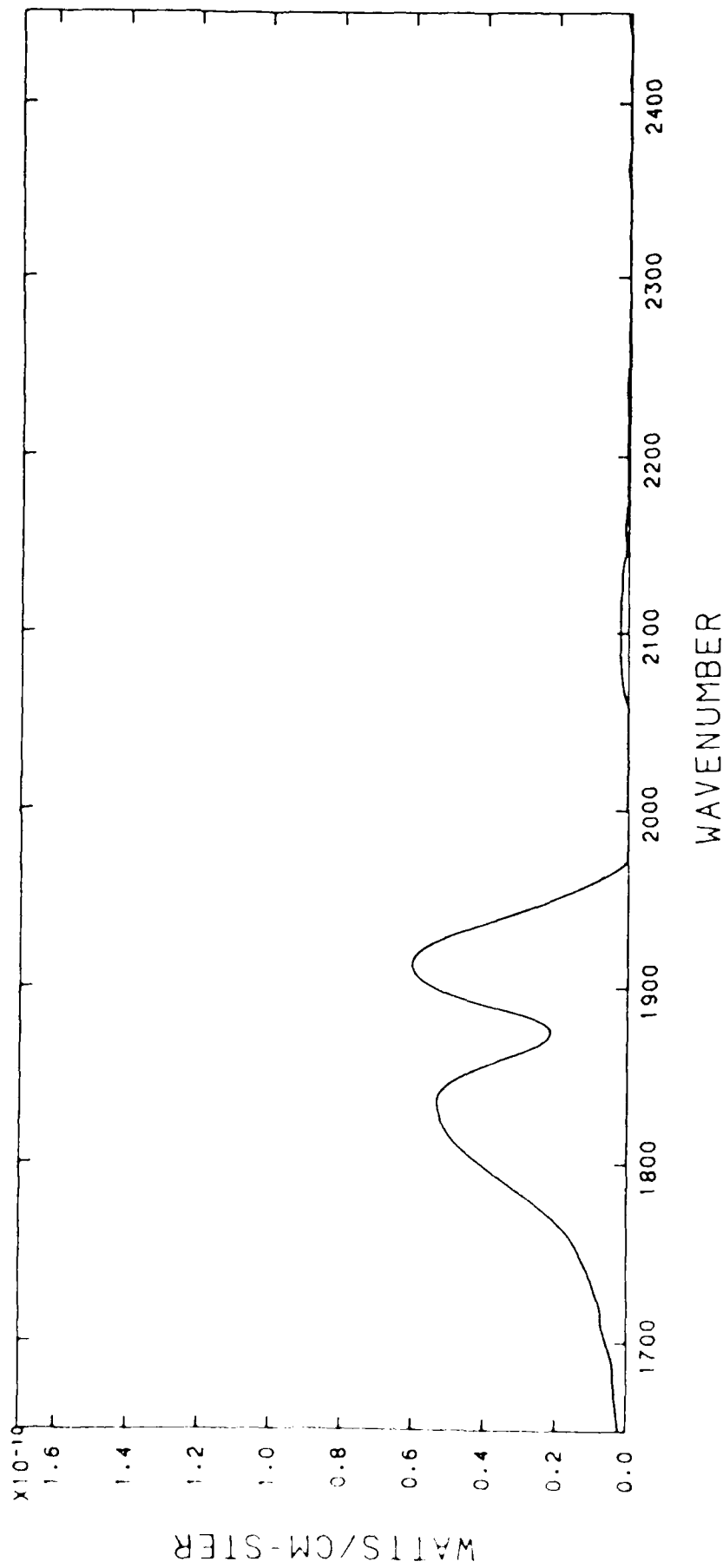


FILE 79, TIME 9: 9:50.594, ALT 137.3-137.3 KM

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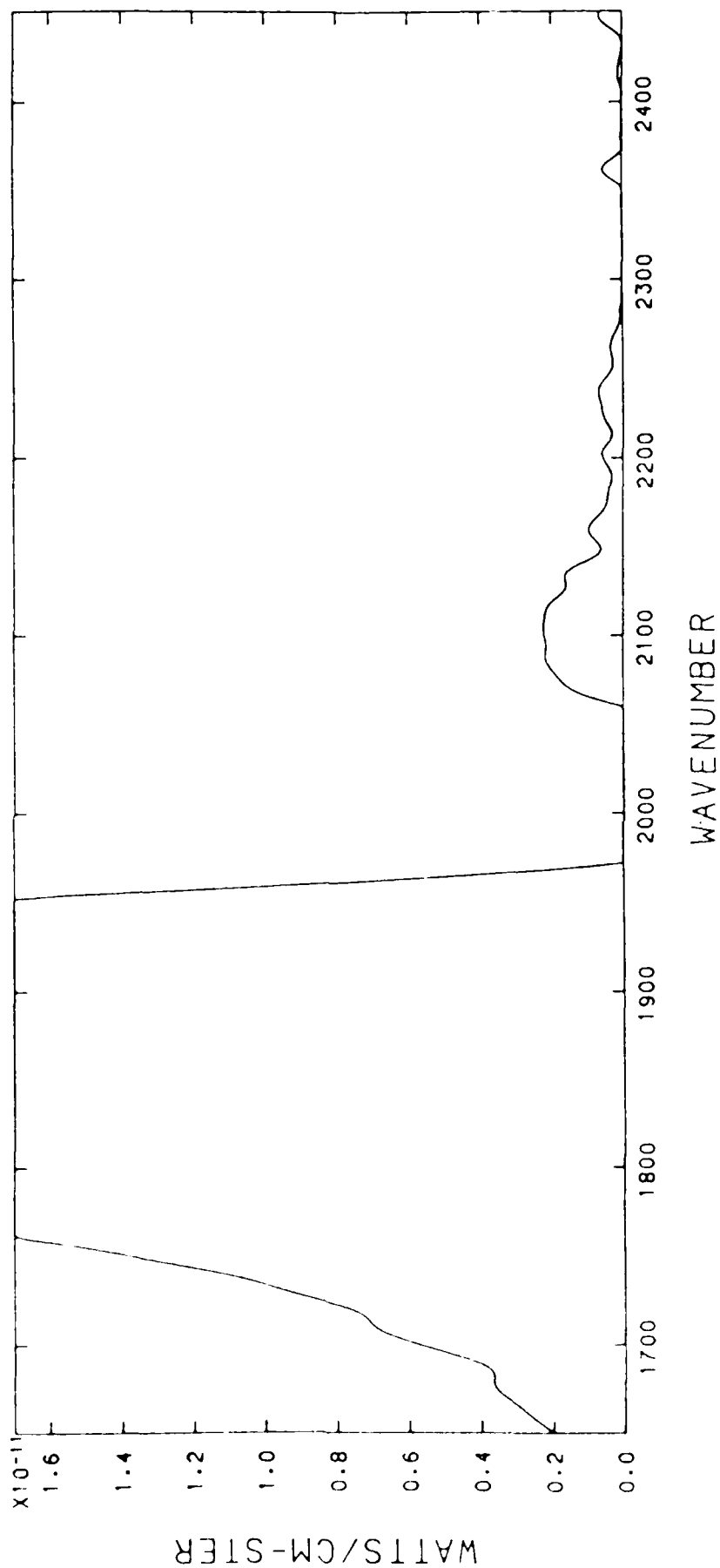


FILE 79, TIME 9: 9:50.594, ALT 137.3-137.3 KM



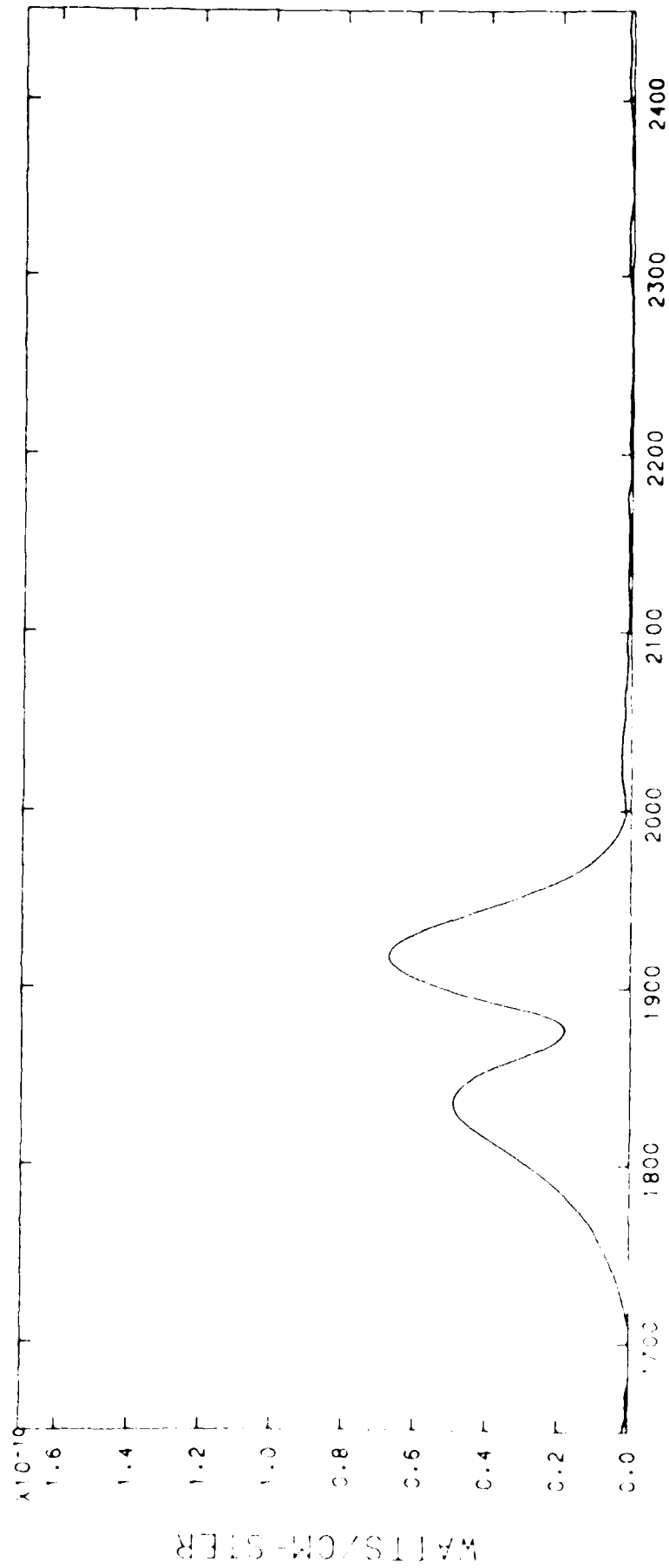
FILE 80, TIME 9: 9:53.374, ALT 136.8-136.7 KM

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FILE 80, TIME 9: 9:53.374, ALT 136.8-136.7 KM

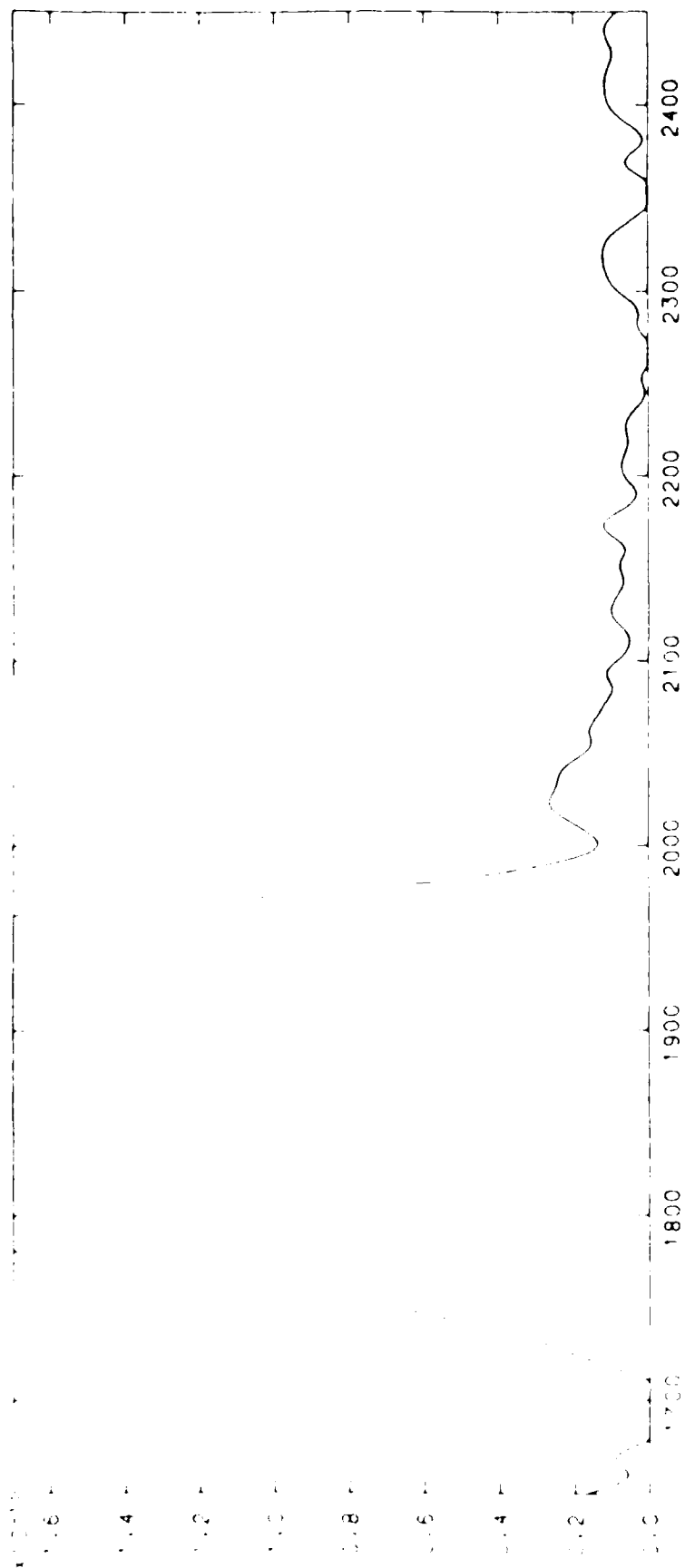




FILE 8, TIME 9: 9:53.872, ALT 136.7-136.6 KM

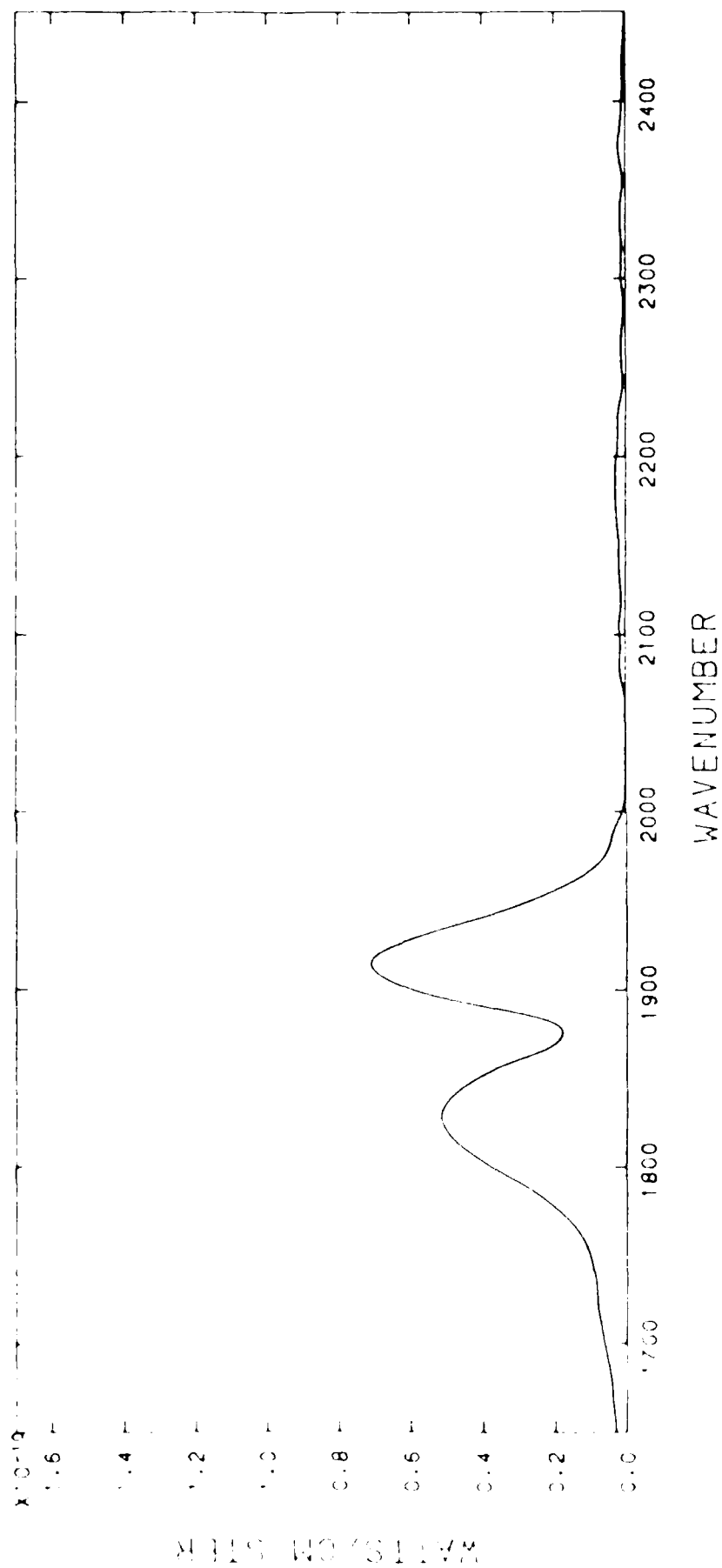
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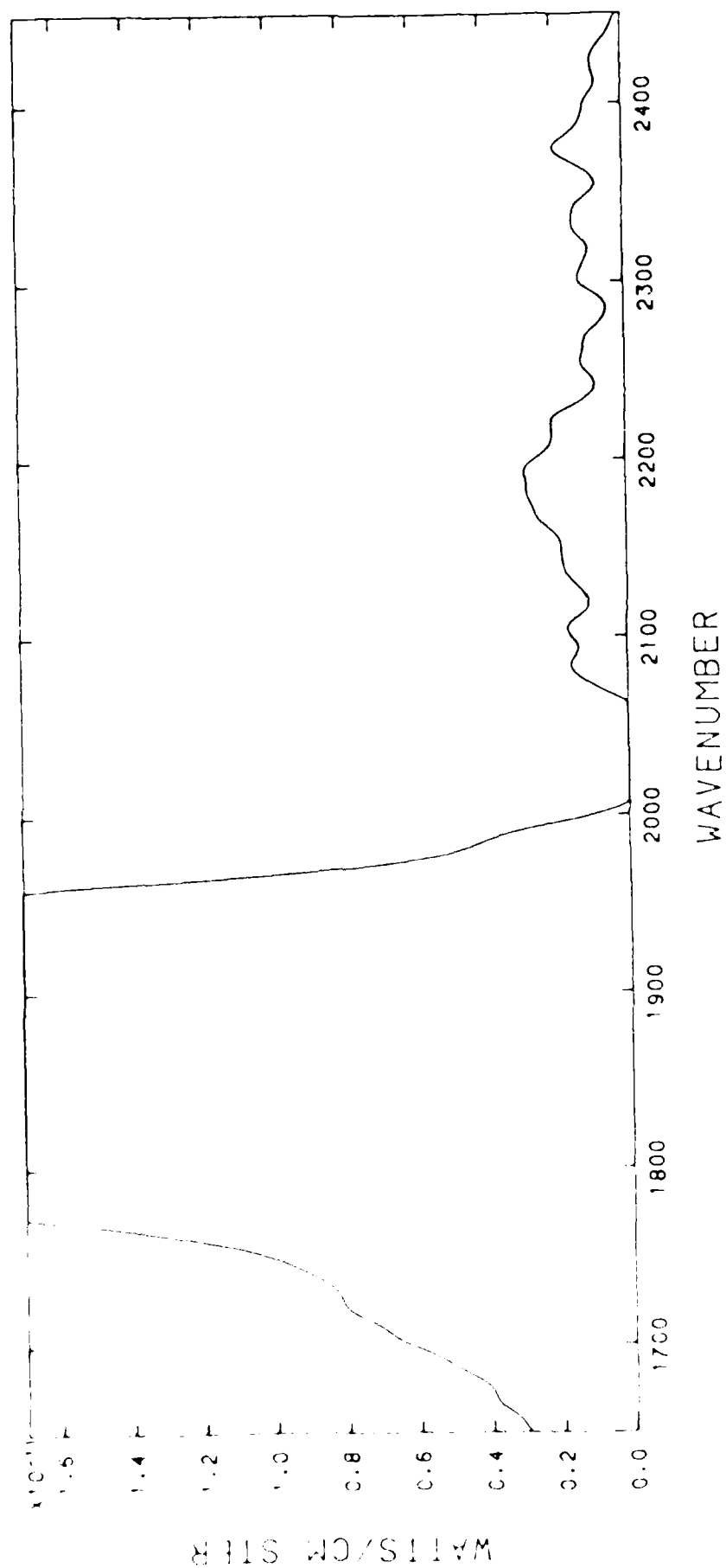


WAVENUMBER

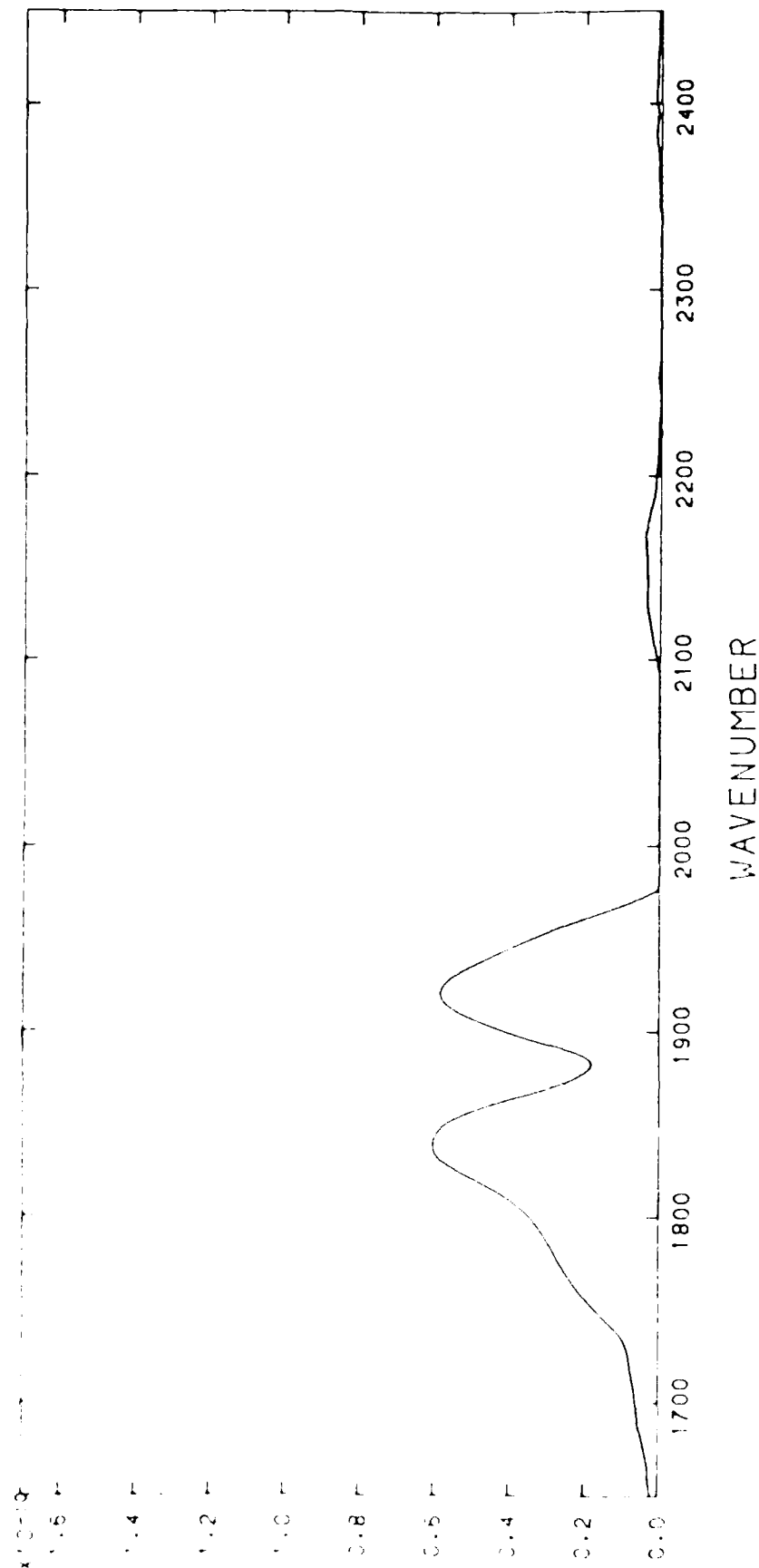
FILE 81, TIME 9: 9:53.872, ALT 136.7-136.6 KM



FILE 82, TIME 9: 9:56.630, ALT 136.0-135.9 KM

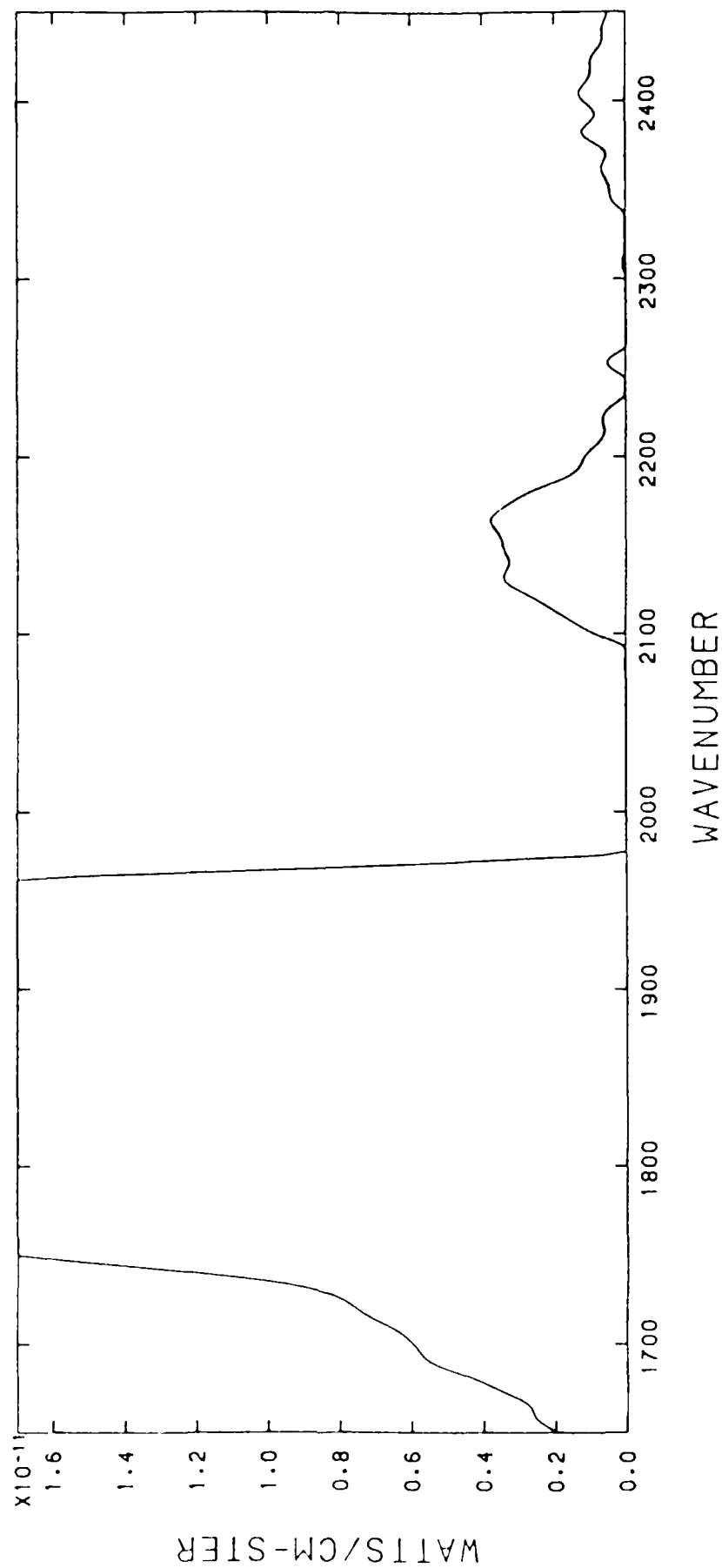


FILE 82, TIME 9: 9:56.630, ALT 136.0-135.9 KM

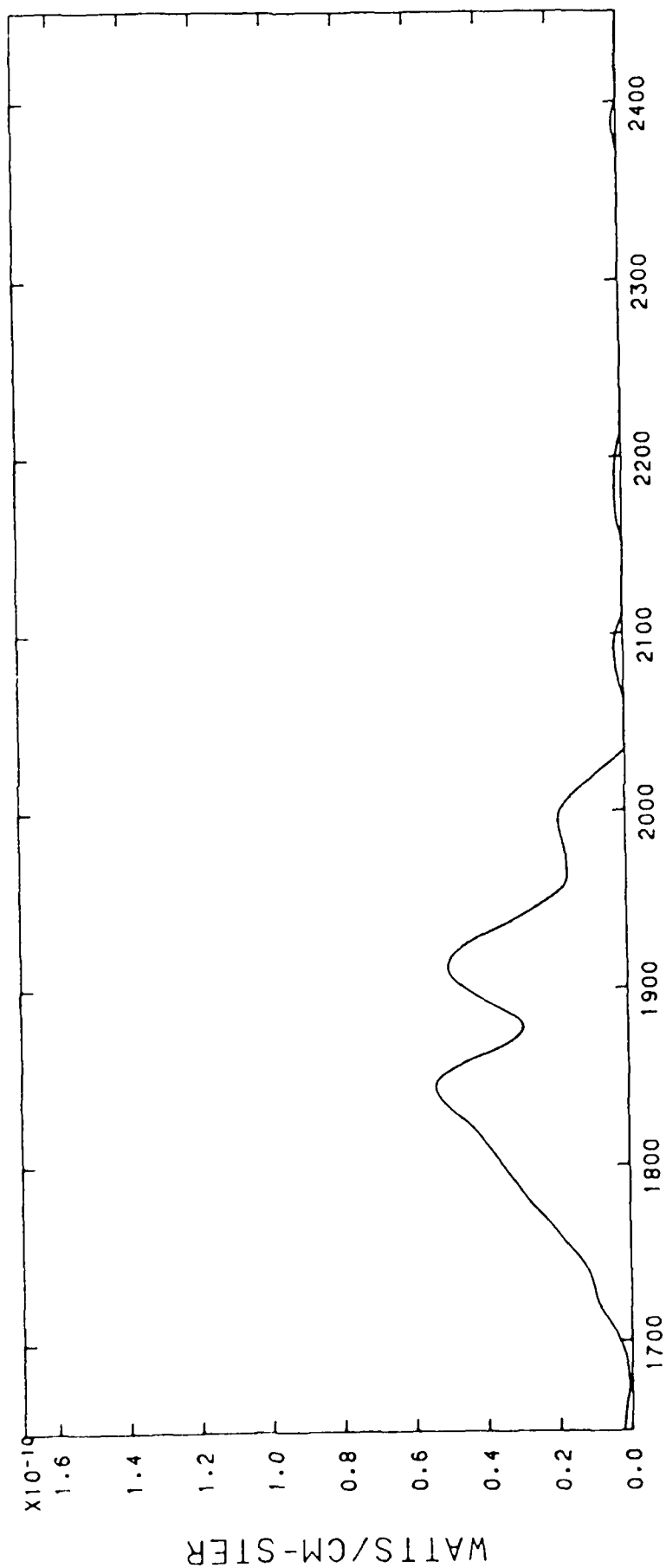


FILE 83, TIME 9: 9:57.126, ALT 135.9-135.8 KM

30-MAY-83 09:32



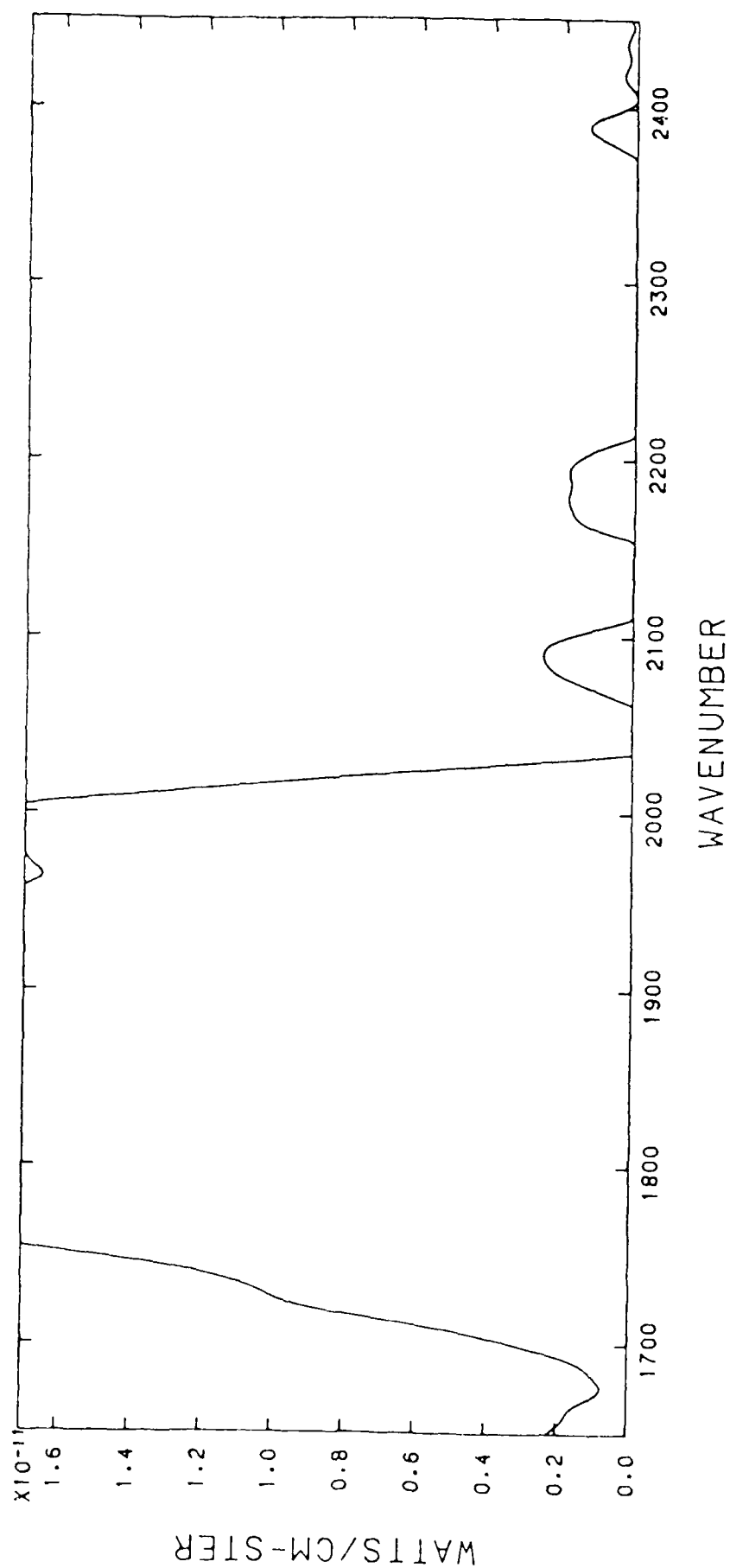
FILE 83, TIME 9: 9:57.126, ALT 135.9-135.8 KM



WAVENUMBER

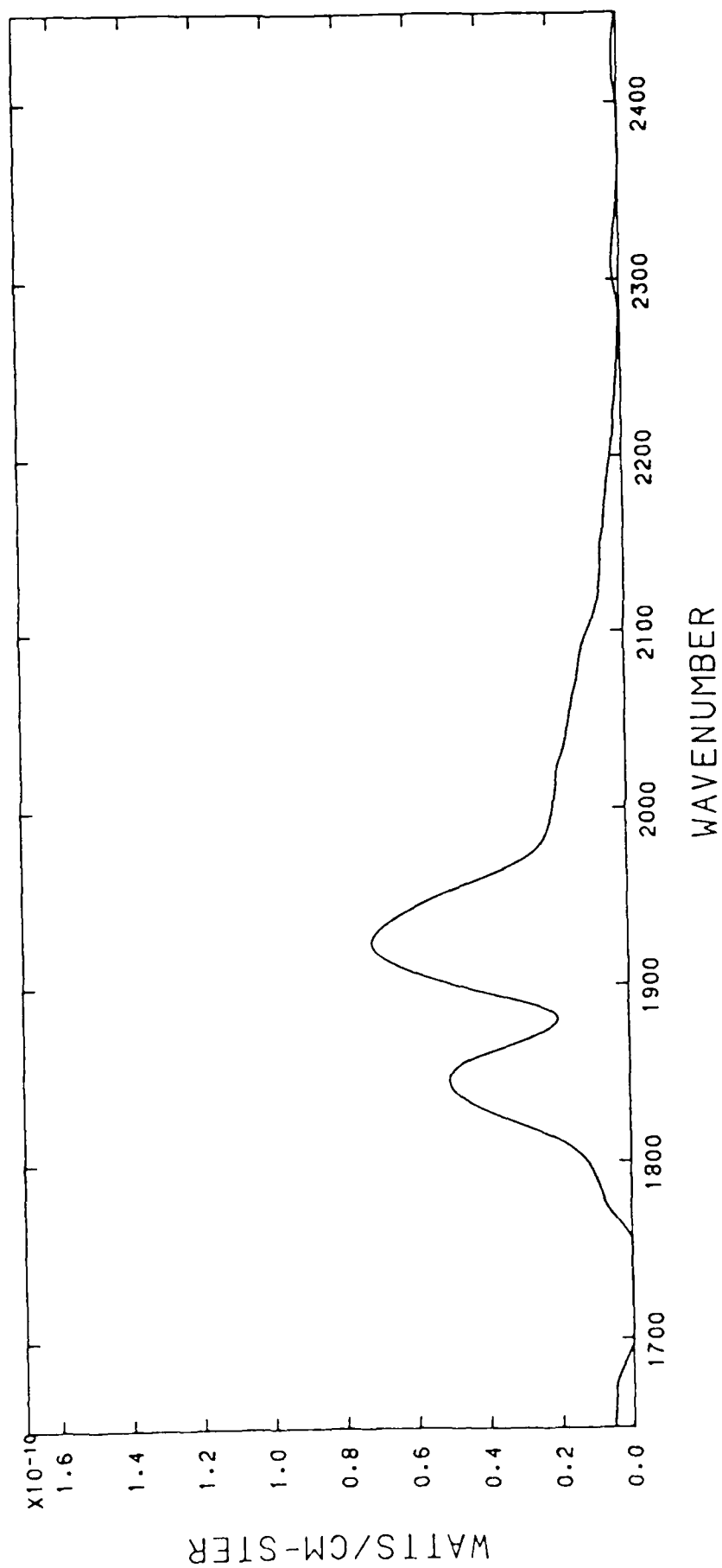
FILE 84, TIME 9: 9:59.884, ALT 135.1-135.0 KM

30-NOV-83 09:32

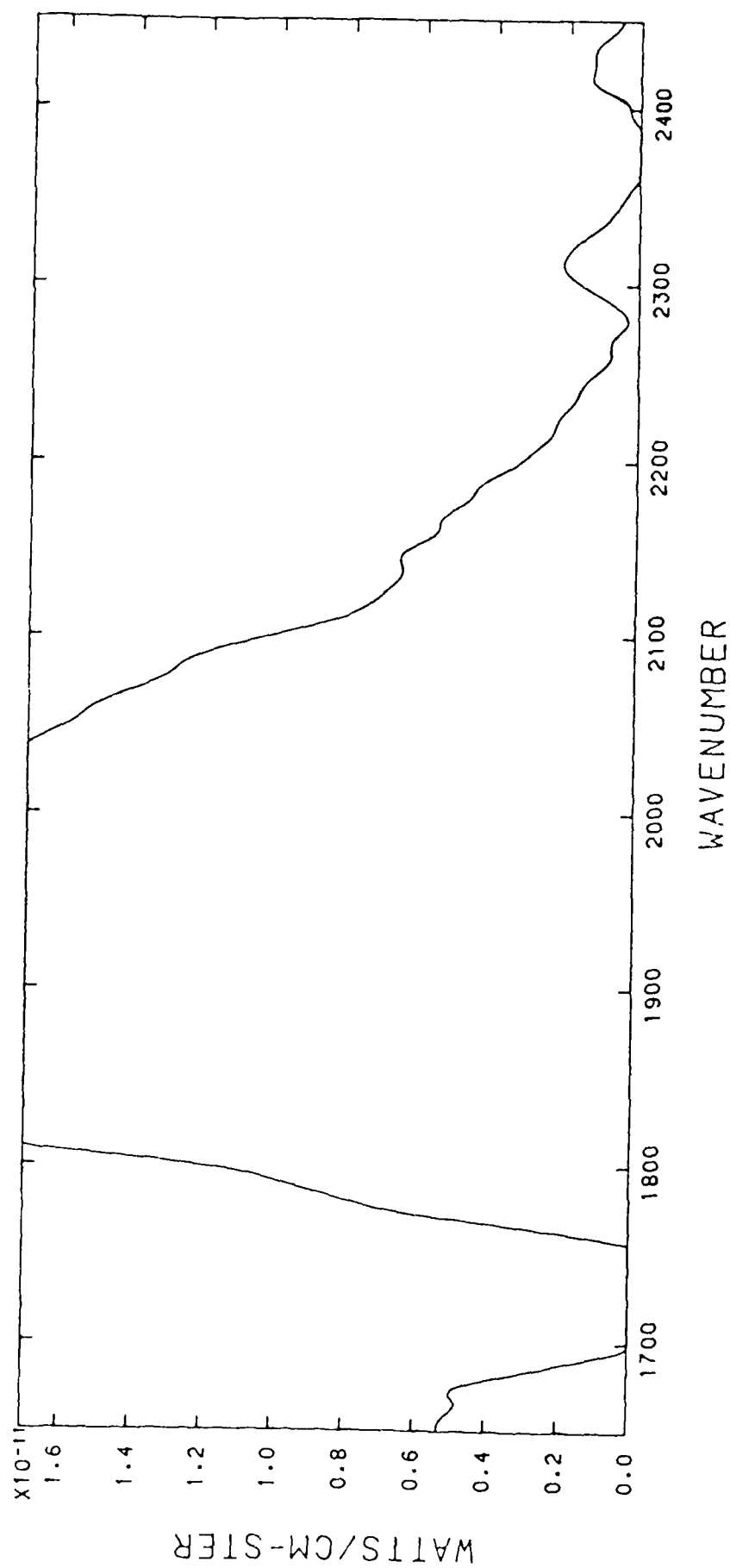


FILE 84, TIME 9: 9:59.884, ALT 135.1-135.0 KM

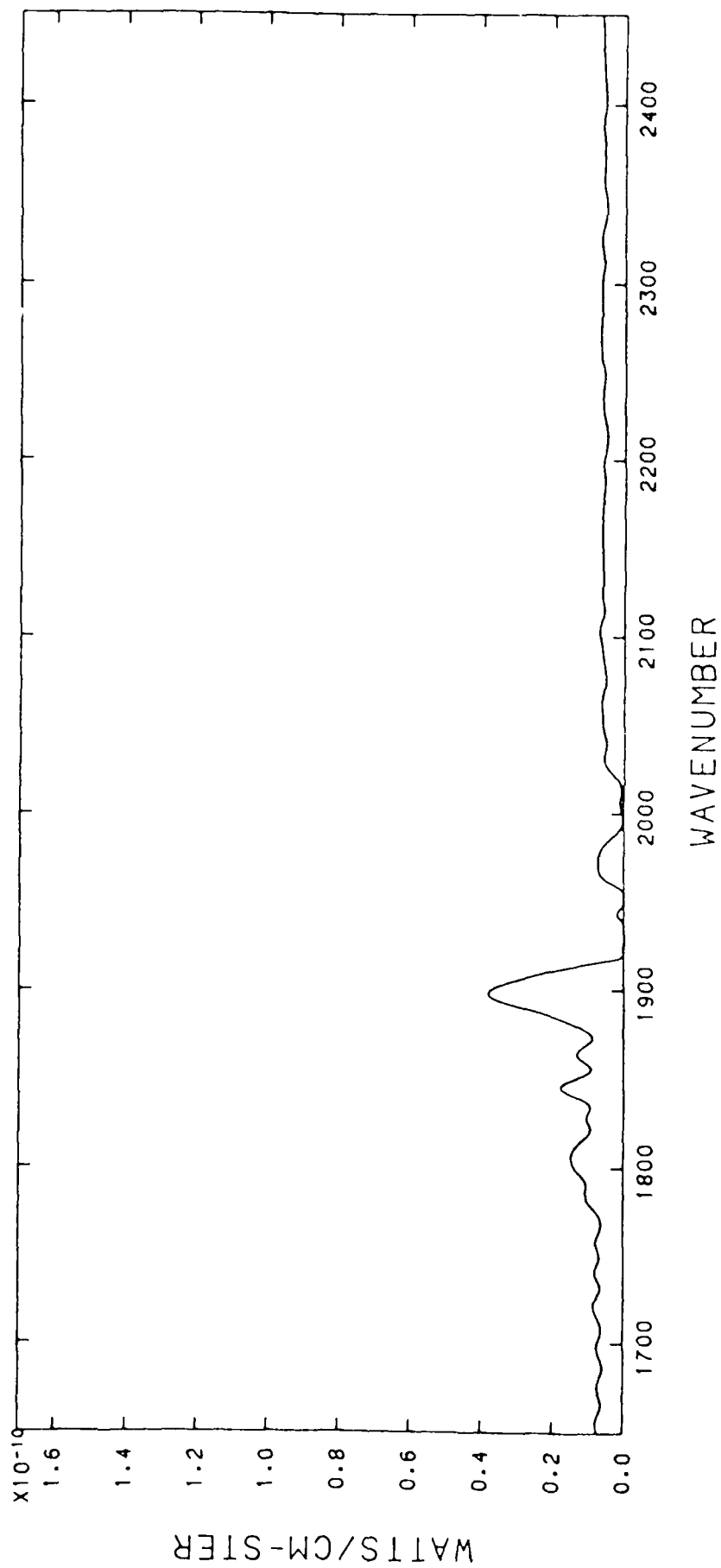




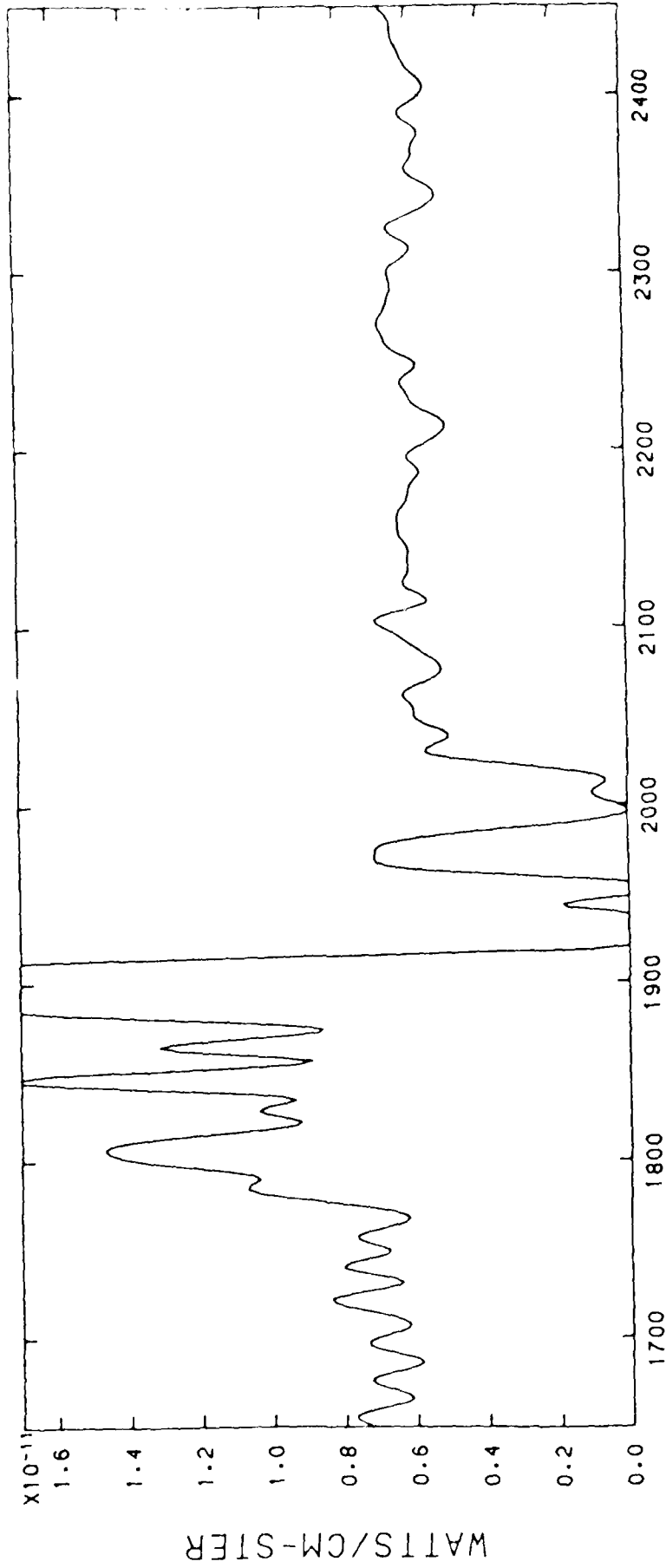
FILE 85, TIME 9:10: 0.380, ALT 135.0-134.9 KM



FILE 85, TIME 9:10: 0.380, ALT 135.0-134.9 KM



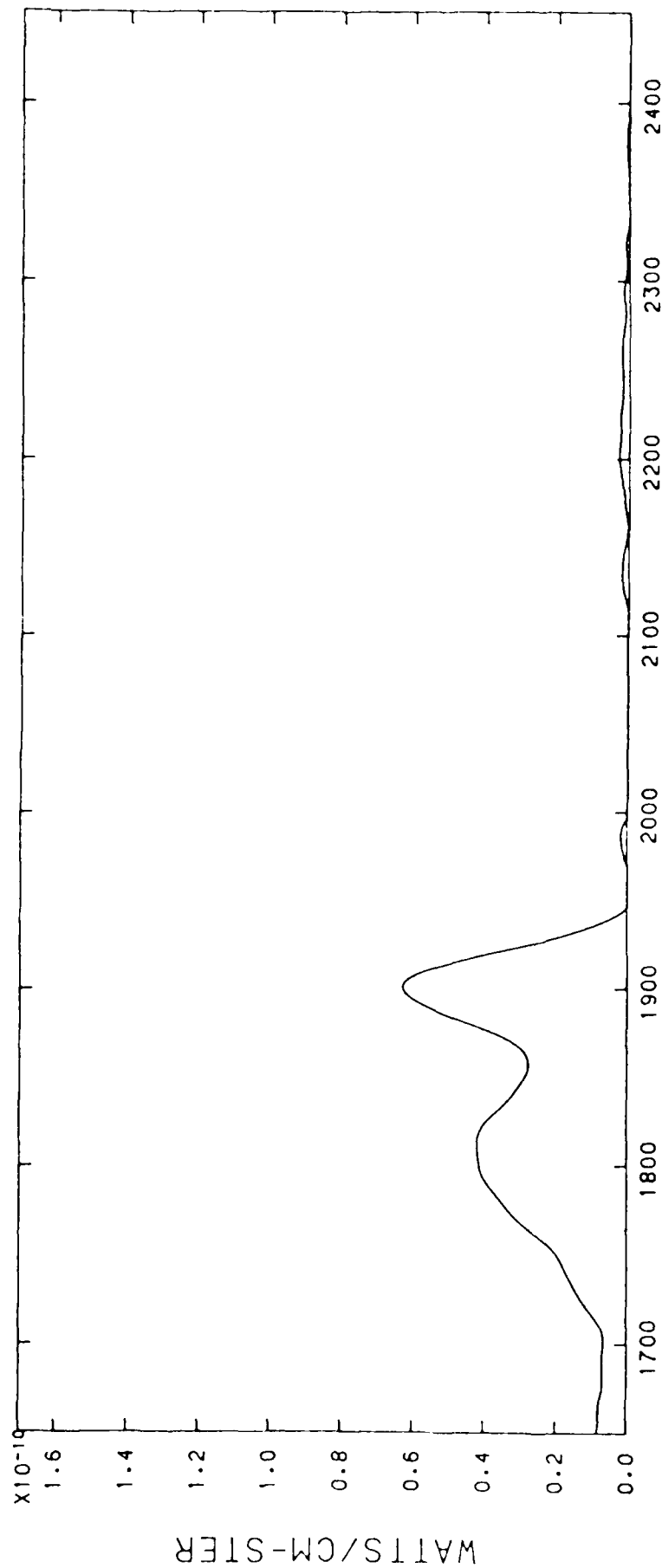
FILE 86, TIME 9:10: 2.332, ALT 134.4-134.3 KM



WAVENUMBER

FILE 86, TIME 9:10: 2.332, ALT 134.4-134.3 KM

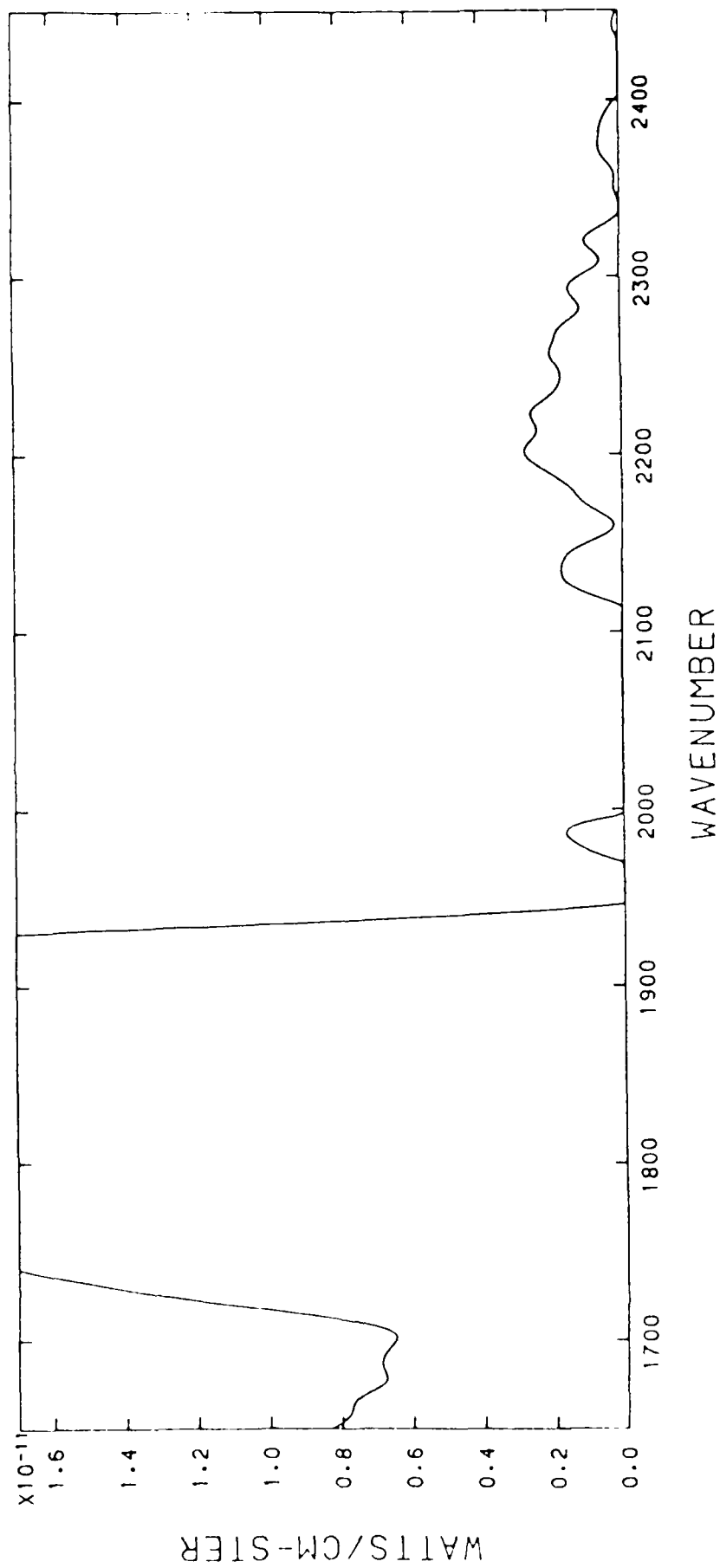
30-NOV-83 09:32



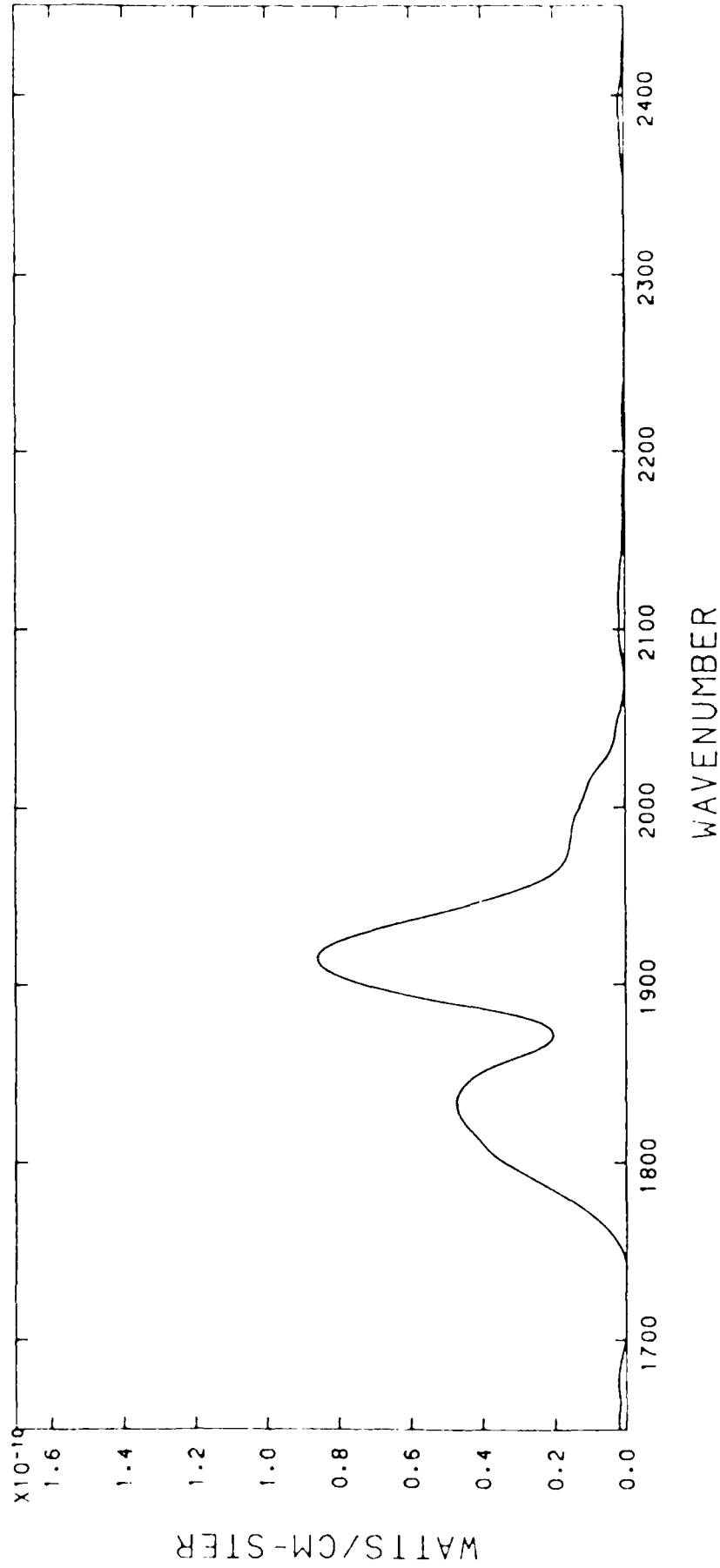
WAVENUMBER

FILE 87, TIME 9:10: 3.636, ALT 134.0-133.9 KM

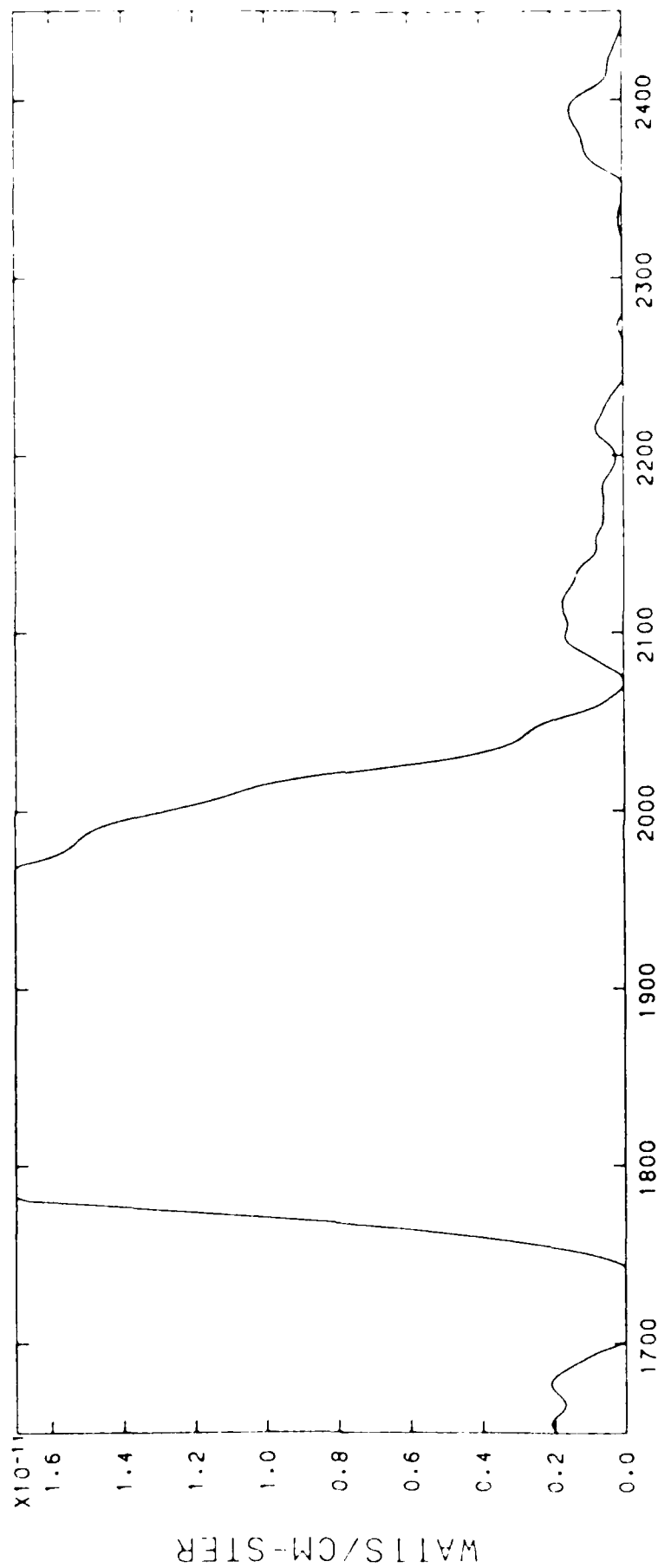
30-NOV-83 09:32



FILE 87, TIME 9:10: 3.636, ALT 134.0-133.9 KM



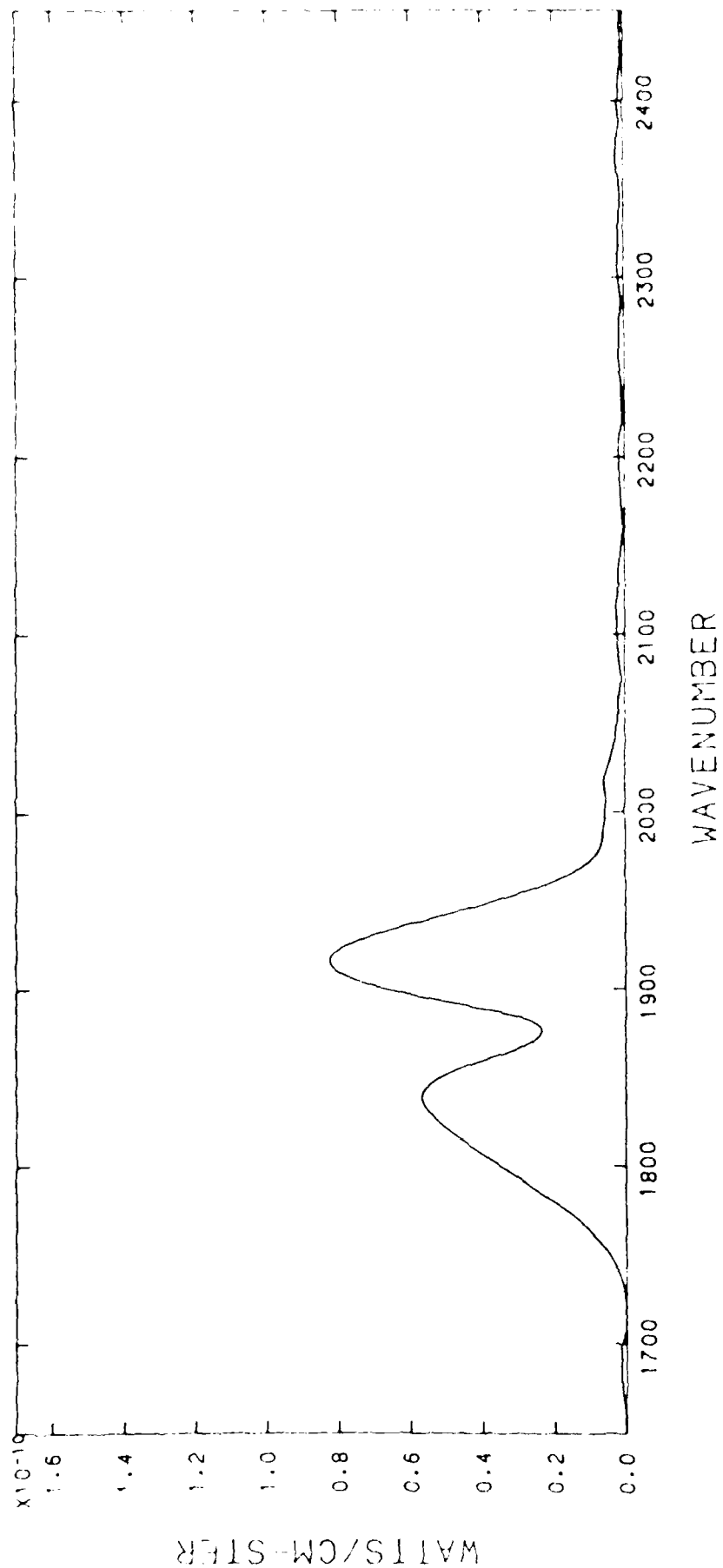
FILE 88, TIME 9:10: 6.390, ALT 133.1-133.0 KM



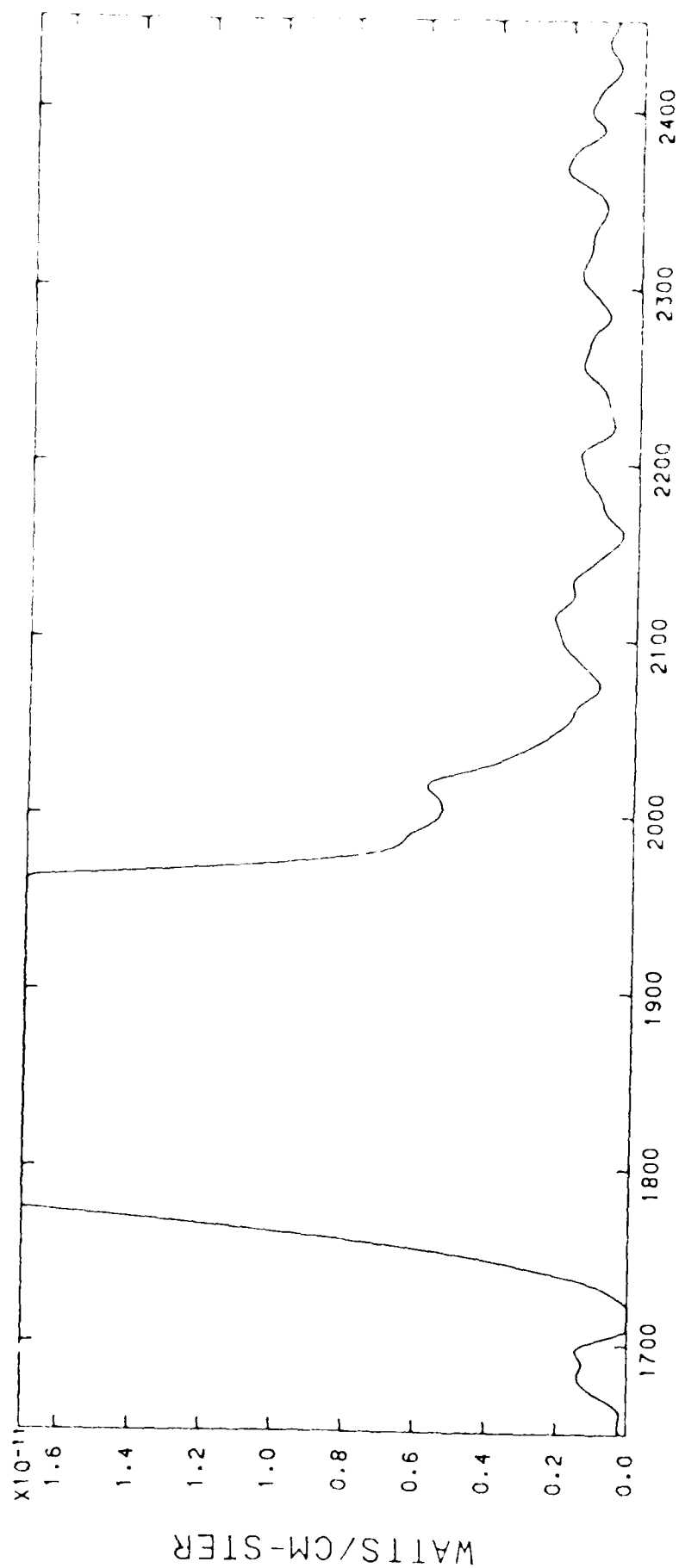
WAVENUMBER

FILE 88, TIME 9:10: 6.390, ALT 133.1-133.0 KM

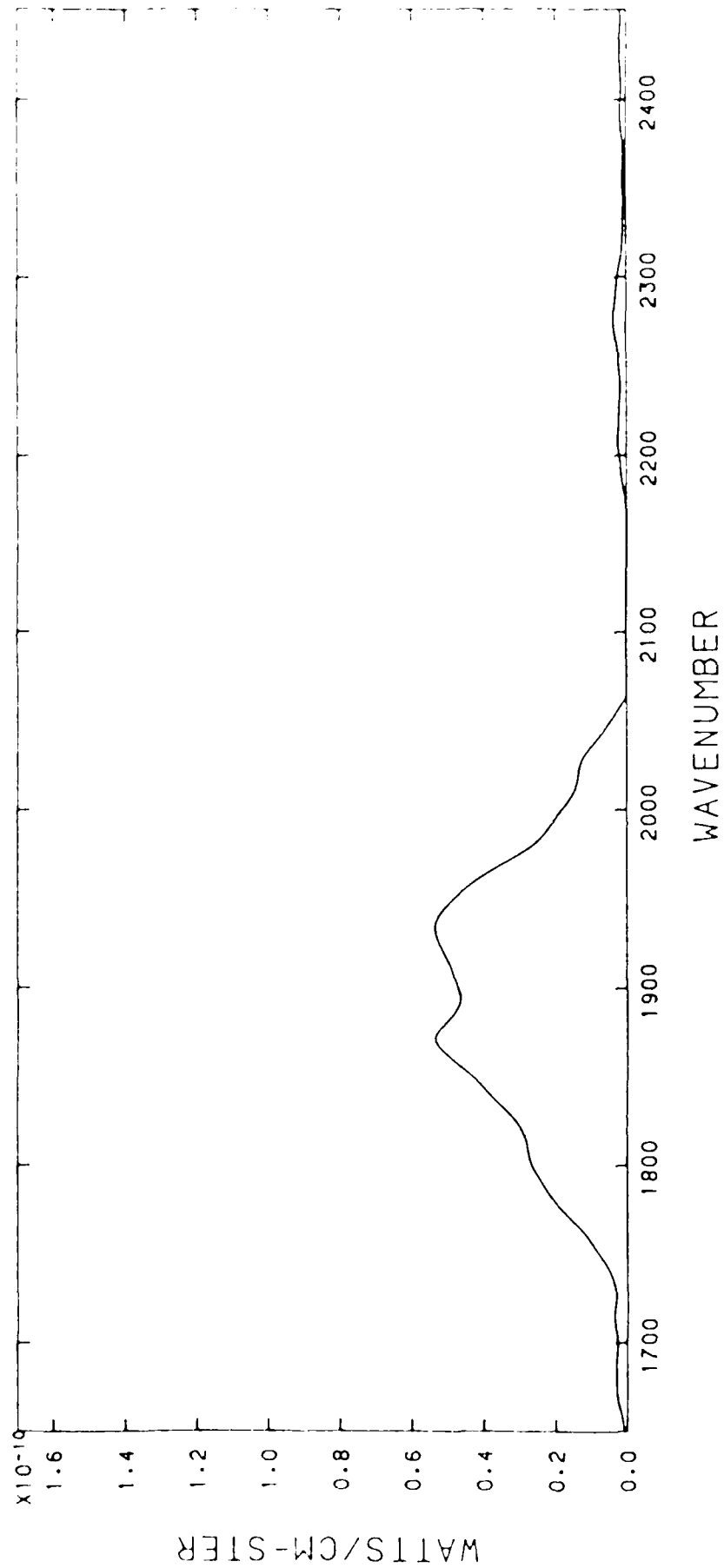




FILE 89, TIME 9:10: 6.888, ALT 133.0-132.8 KM

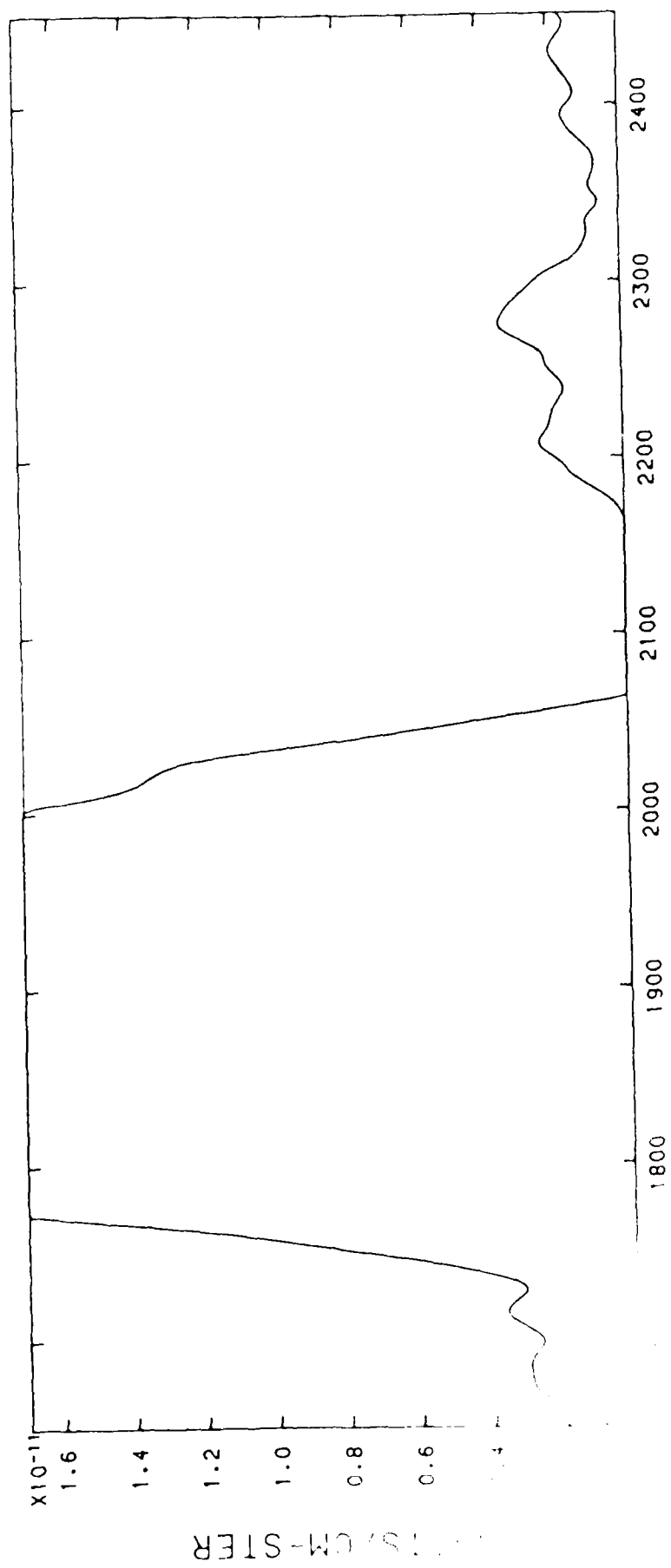


FILE 89, TIME 9:10: 6.888, ALT 133.0-132.8 KM



FILE 90, TIME 9:10: 9.644, ALT 132.0-131.8 KM

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WAVENUMBER

9:10: 9.644, ALT 132.0-131.8 KM

AD-A181 164

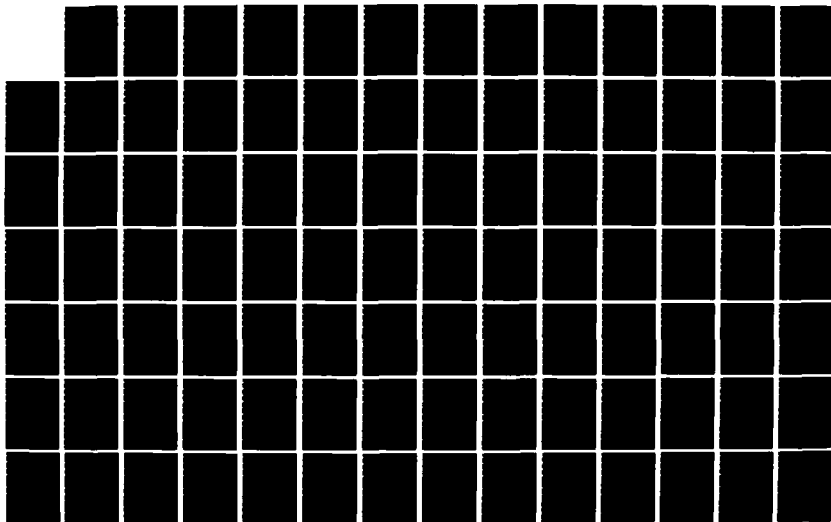
CATALOG OF LOW RESOLUTION INFRARED SPECTRA:  
FIELD-WIDENED INTERFEROMETER (U) UTAH STATE UNIV LOGAN  
SPACE DYNAMICS LABS R H HAYCOCK ET AL 26 JUN 85

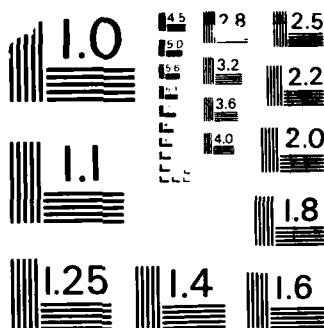
3/4

UNCLASSIFIED

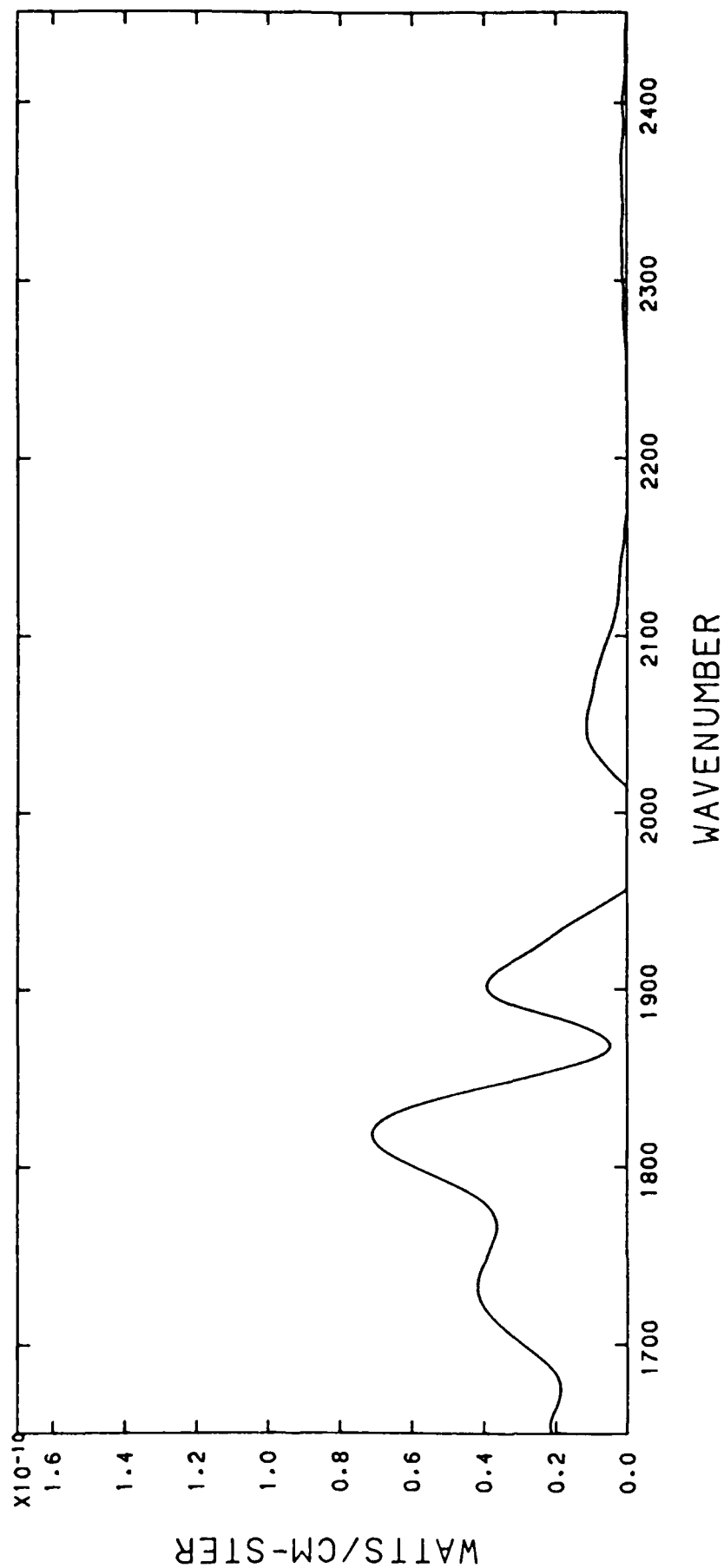
SDL/85-046 AFGL-TR-85-0162 F19628-83-C-0056 F/G 20/6

NL



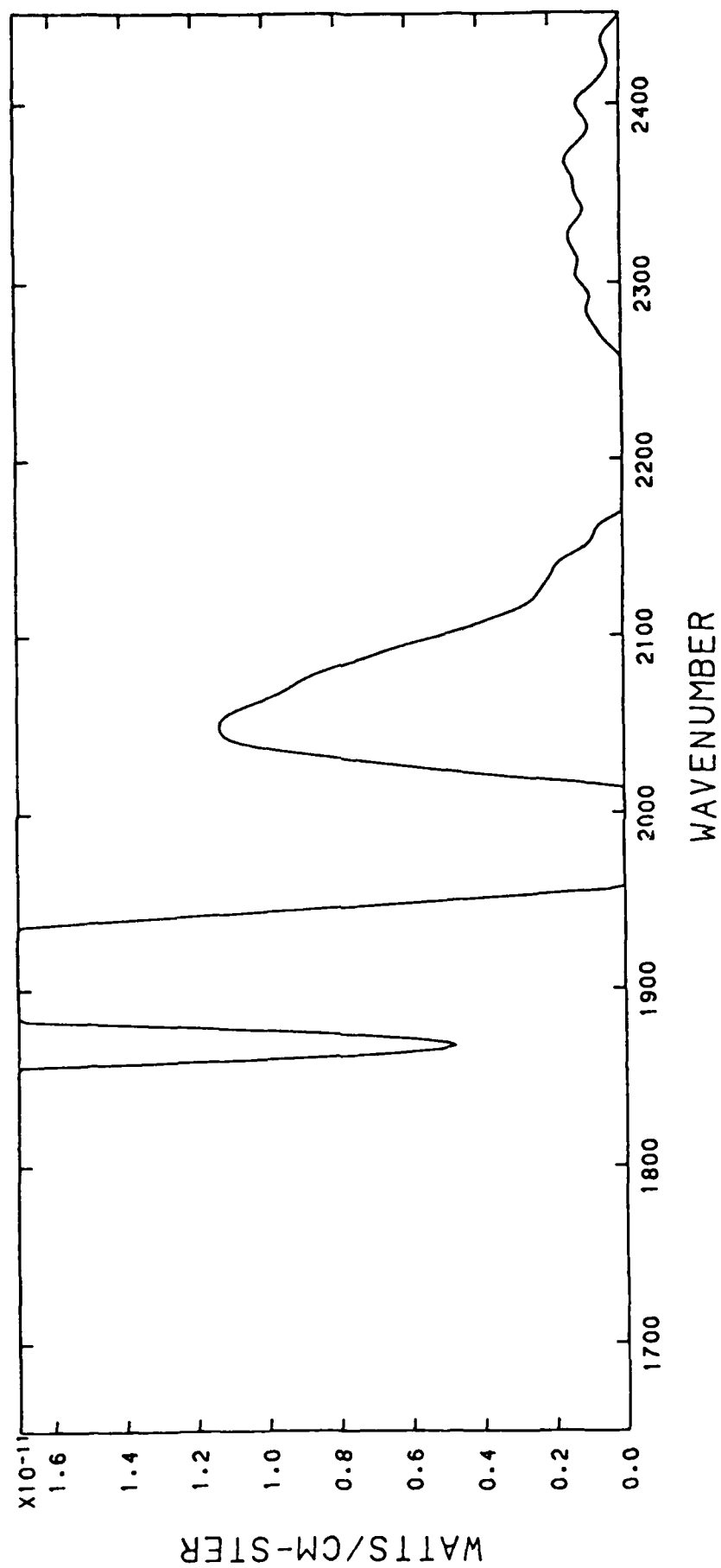


MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



FILE 91, TIME 9:10:10.140, ALT 131.8-131.7 KM

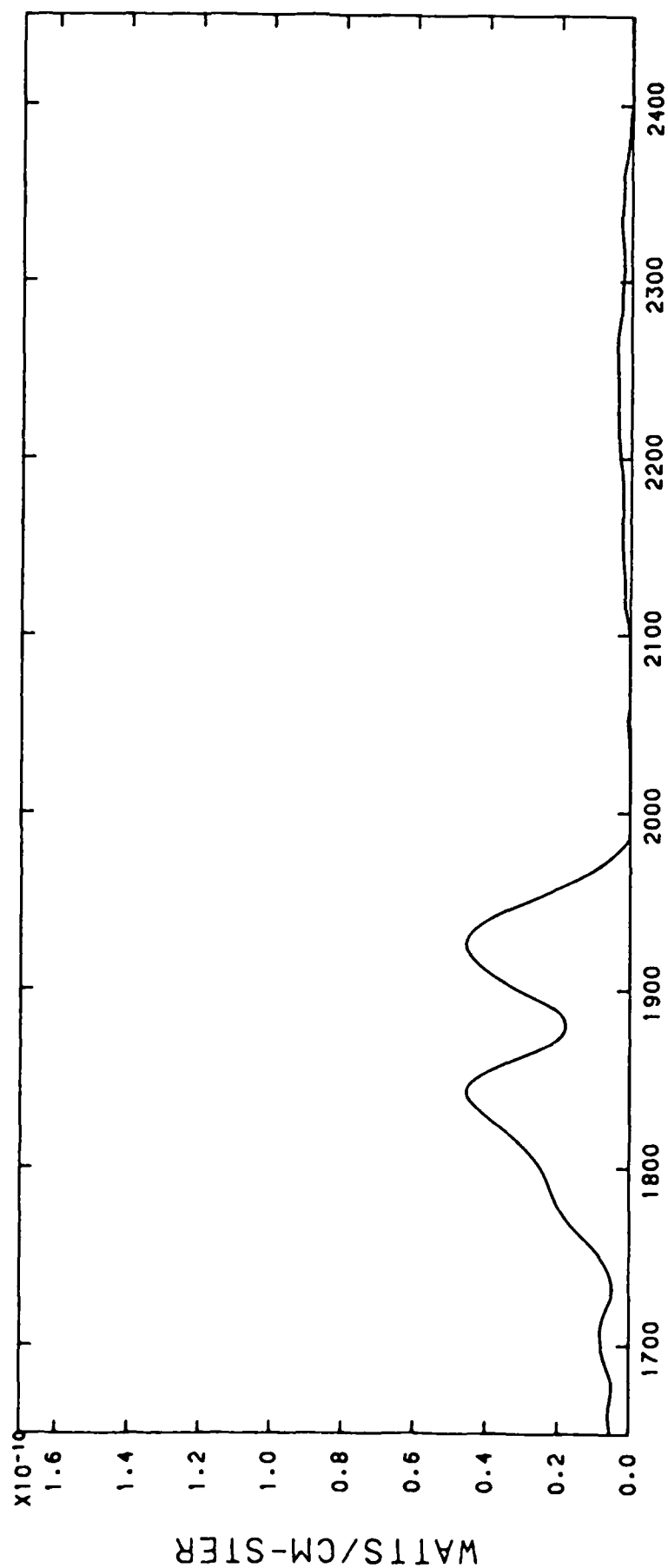
30-NOV-83 09:32



FILE 91, TIME 9:10:10.140, ALT 131.8-131.7 KM

30-NOV-83 09:32

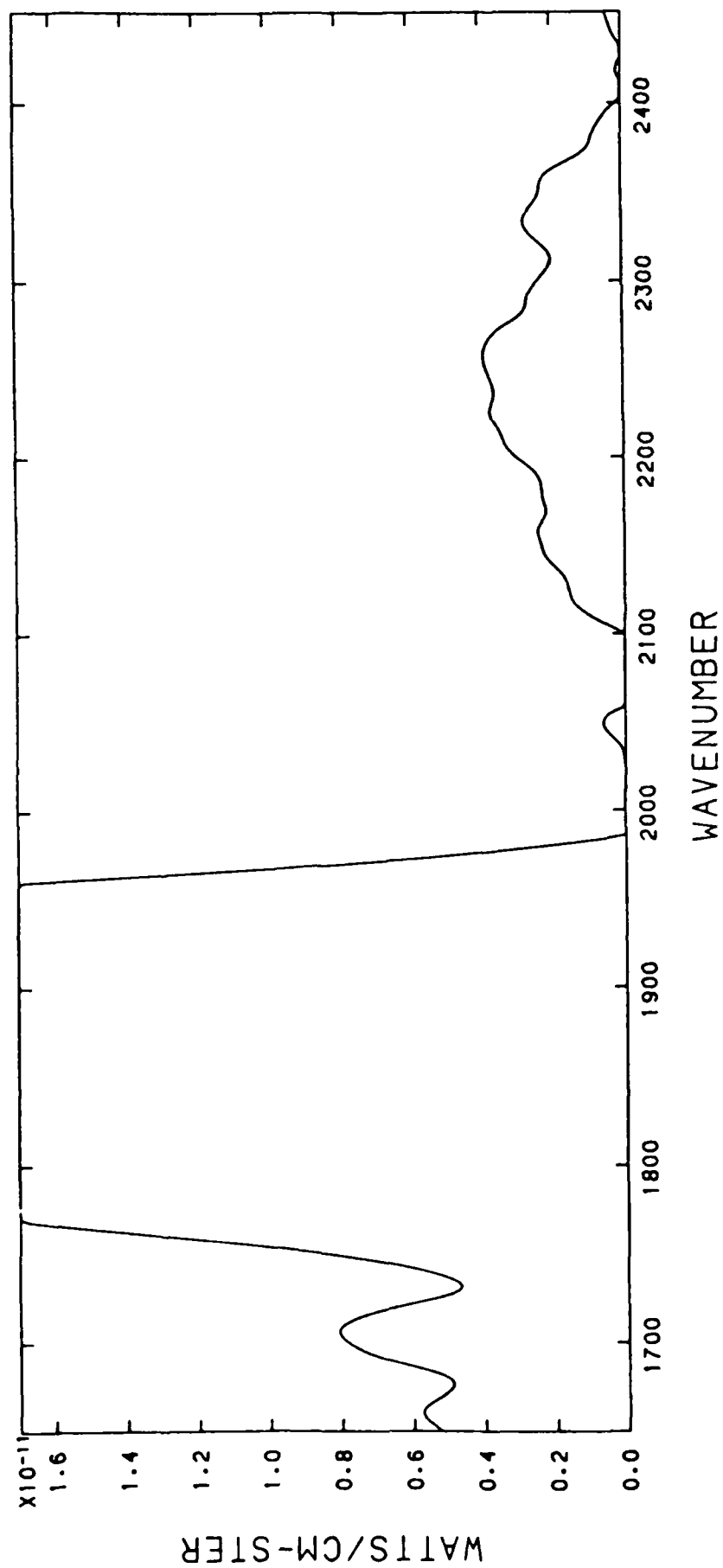




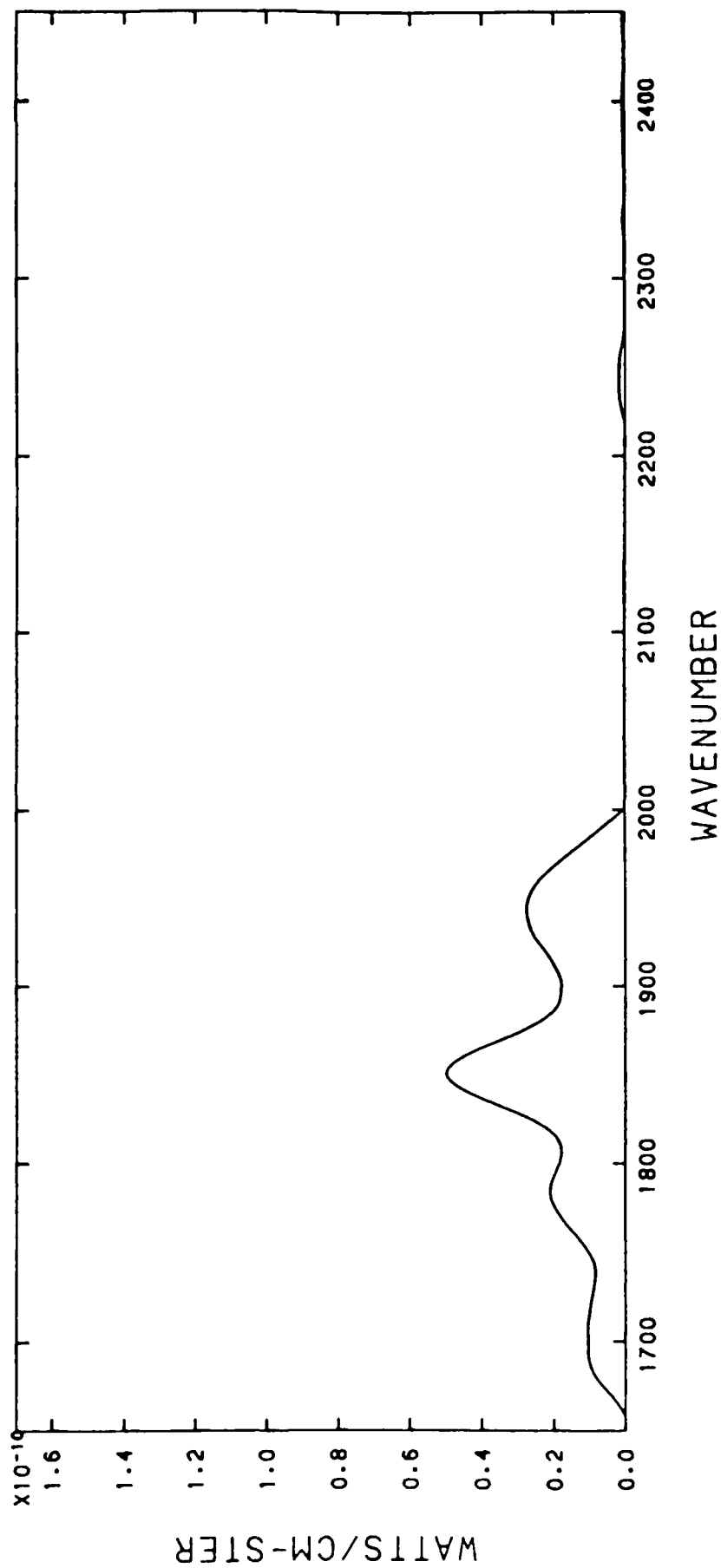
WAVENUMBER

FILE 92, TIME 9:10:12.910, ALT 130.7-130.6 KM

30-NOV-83 09:32

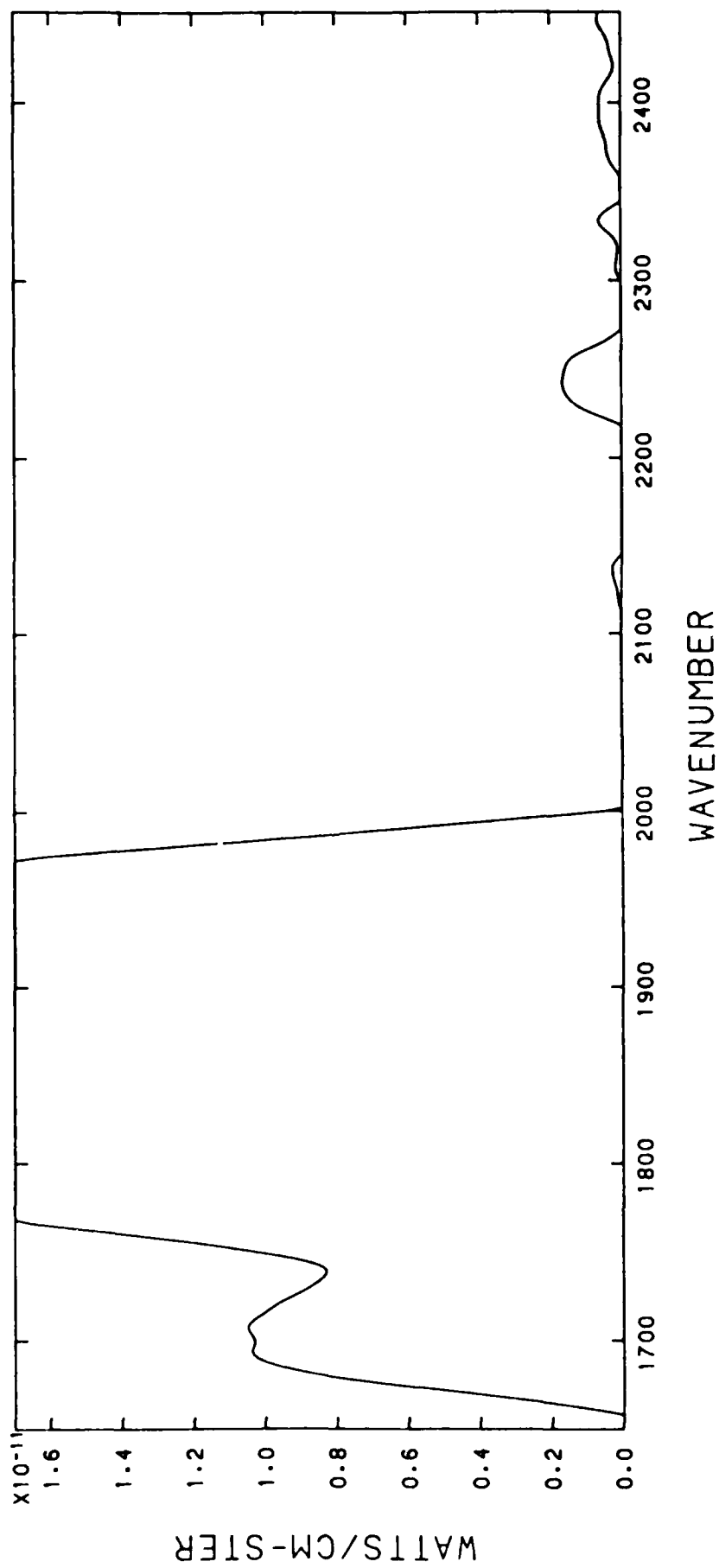


FILE 92, TIME 9:10:12.910, ALT 130.7-130.6 KM

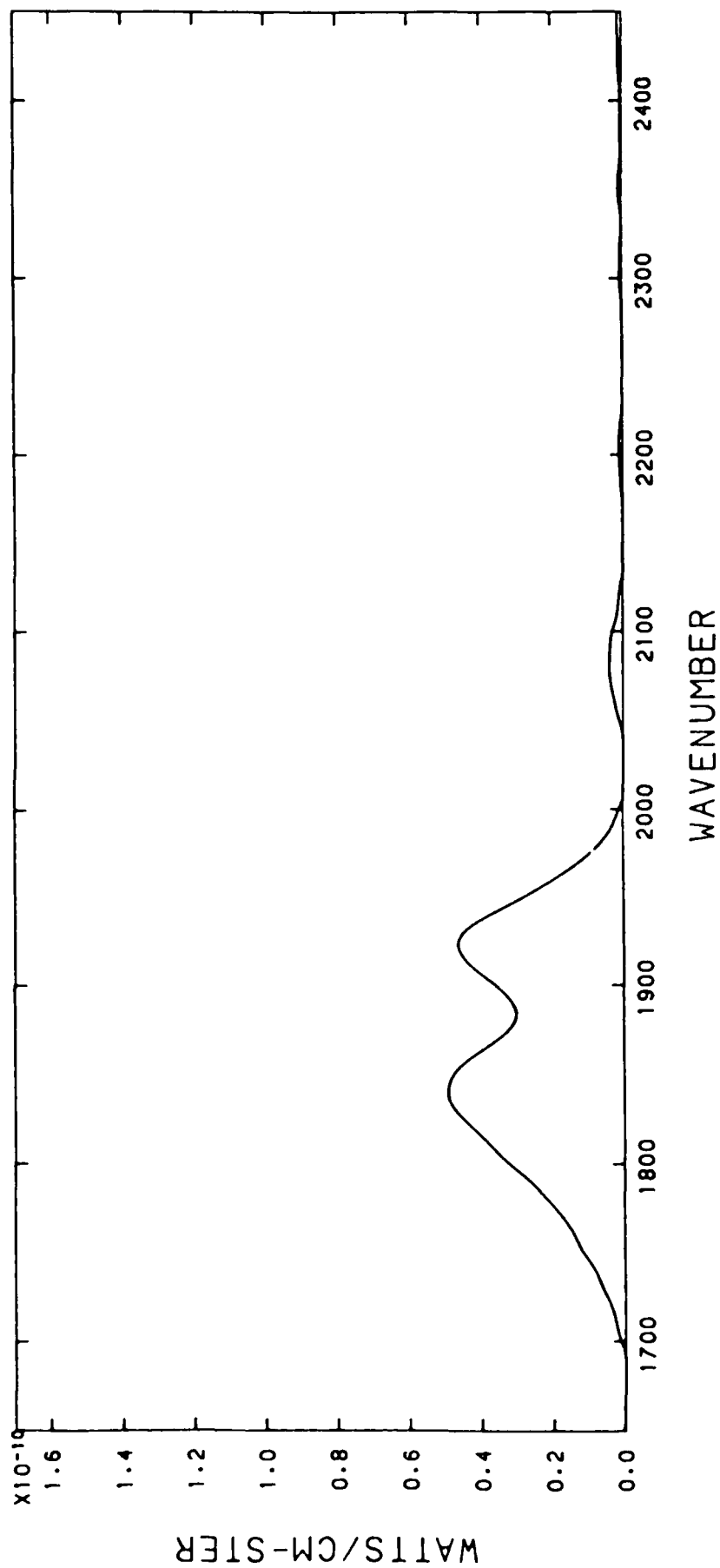


FILE 93, TIME 9:10:13.410, ALT 130.5-130.4 KM

30-NOV-83 09:32

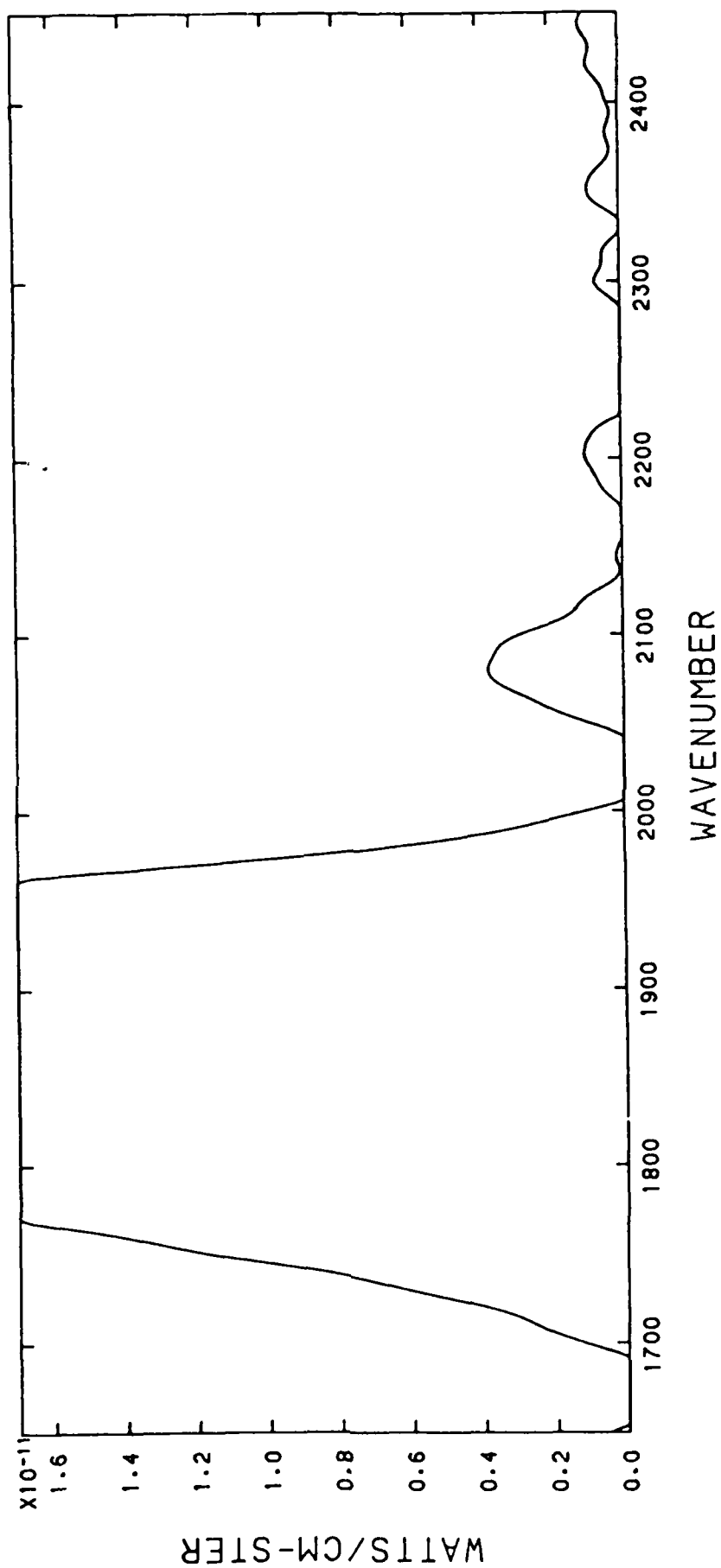


FILE 93, TIME 9:10:13.410, ALT 130.5-130.4 KM

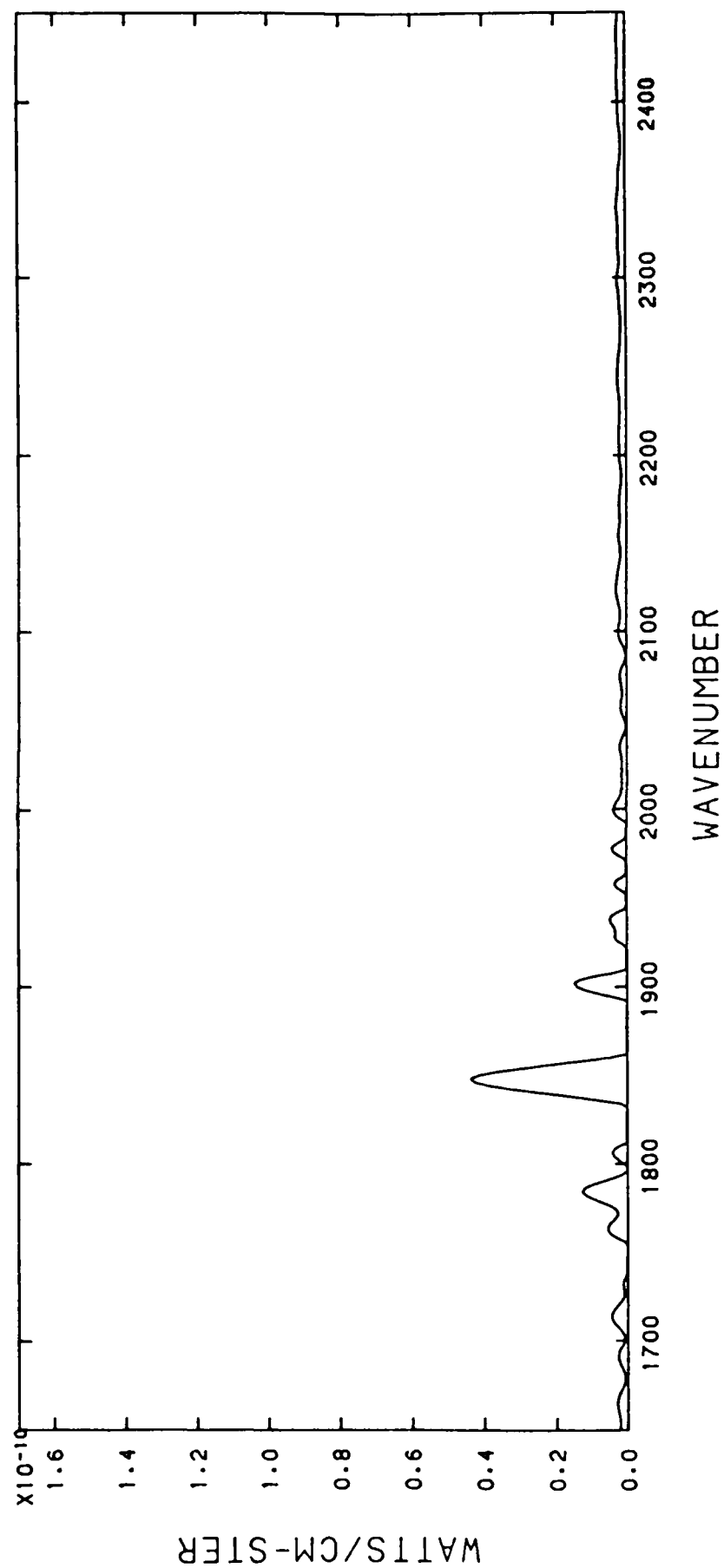


FILE 94, TIME 9:10:16.188, ALT 129.3-129.2 KM

30-NOV-83 09:32

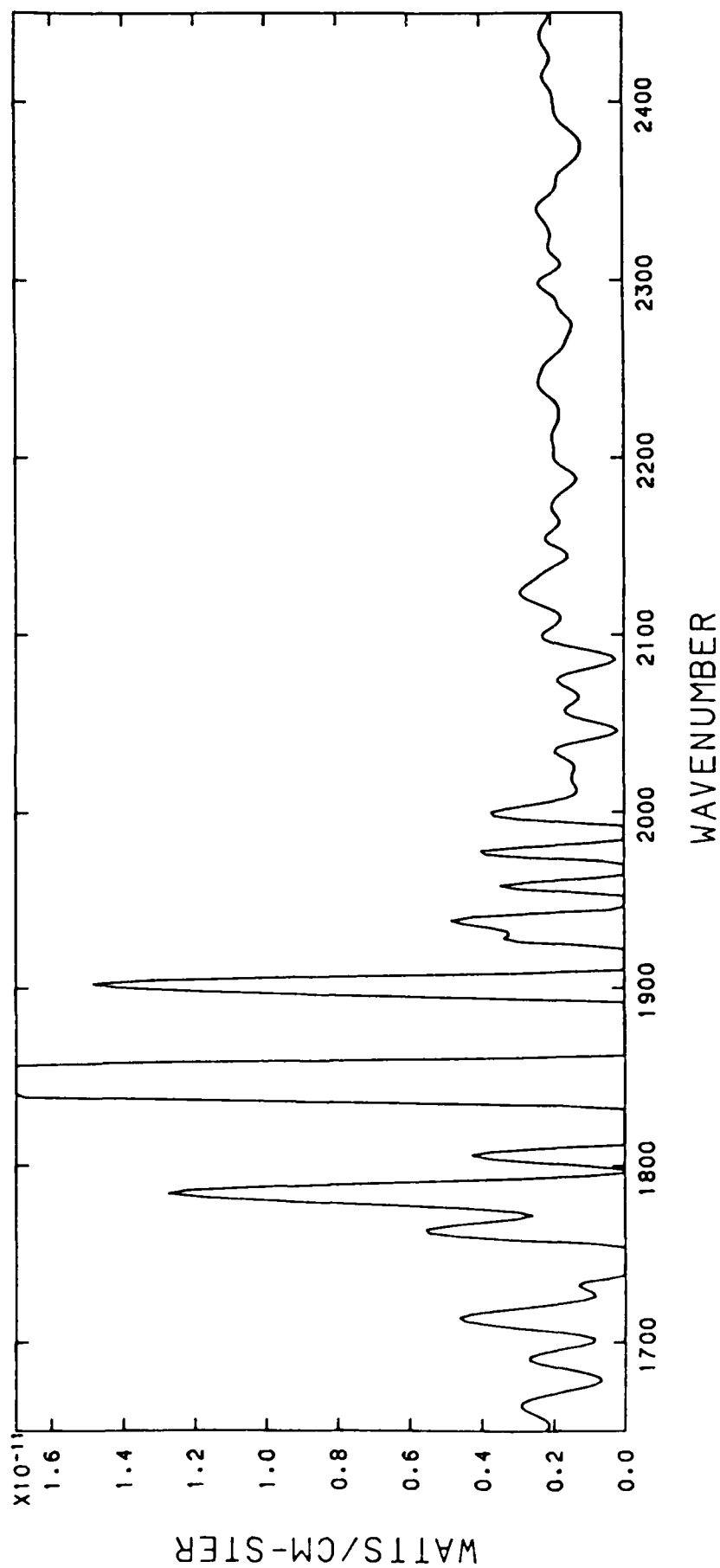


FILE 94, TIME 9:10:16.188, ALT 129.3-129.2 KM



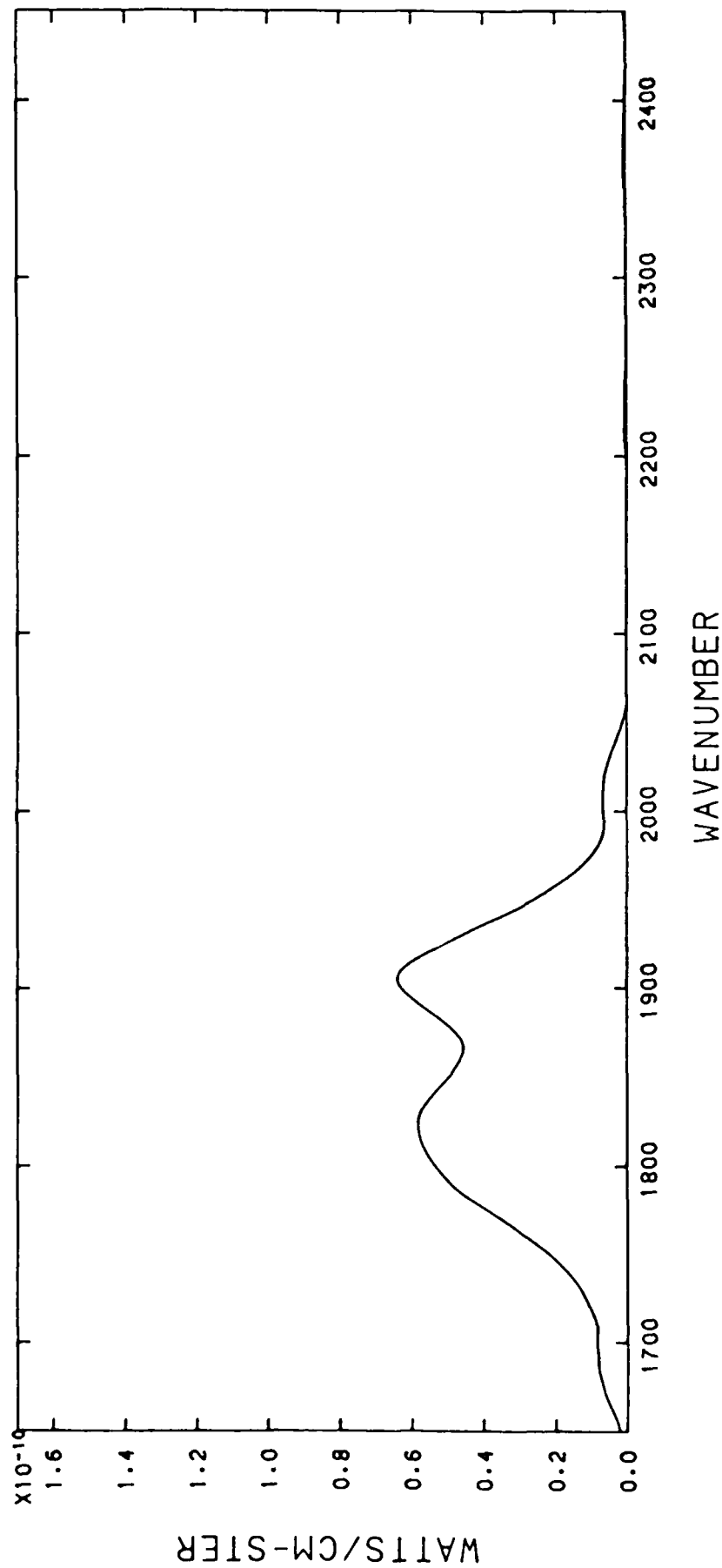
FILE 95, TIME 9:10:17.404, ALT 128.8-128.7 KM

30-NOV-83 09:32



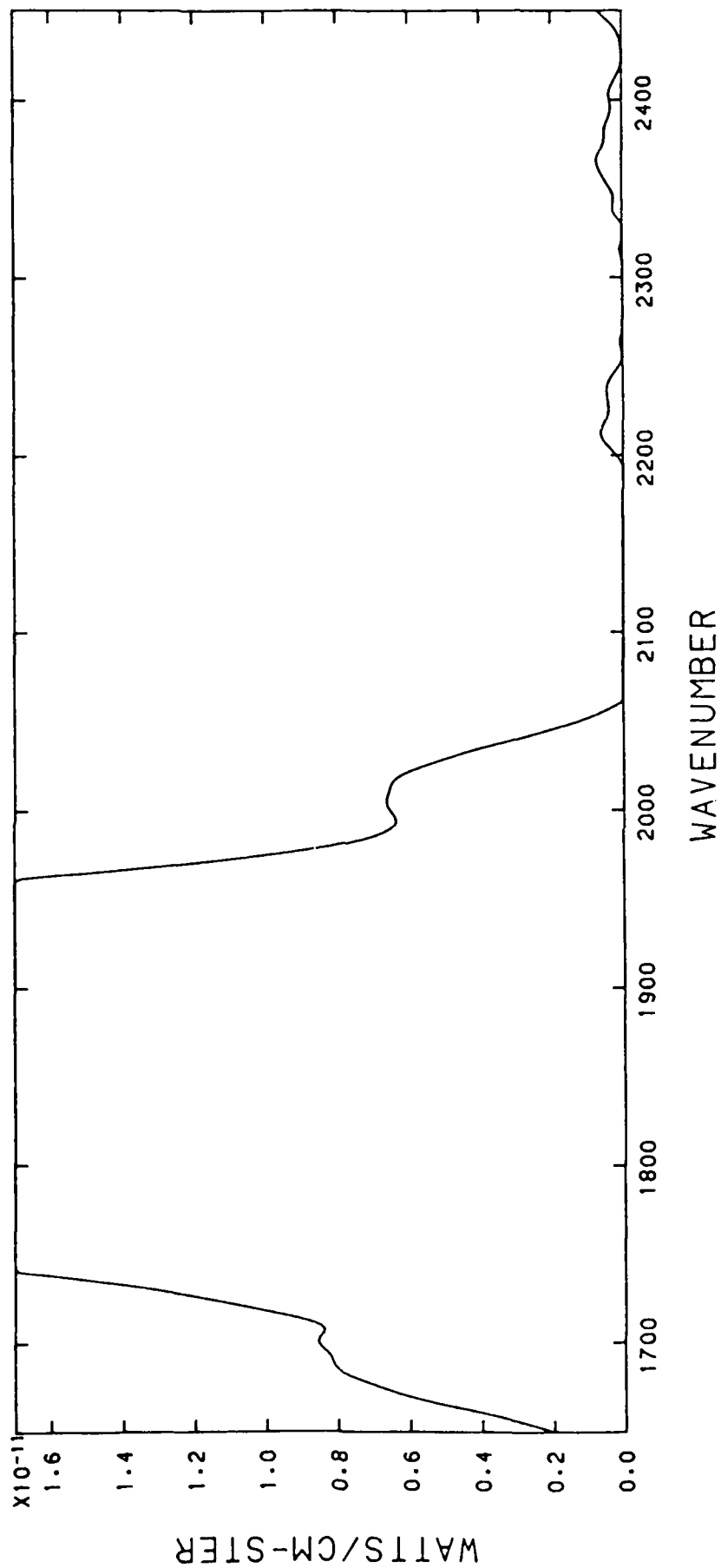
FILE 95. TIME 9:10:17.404, ALT 128.8-128.7 KM



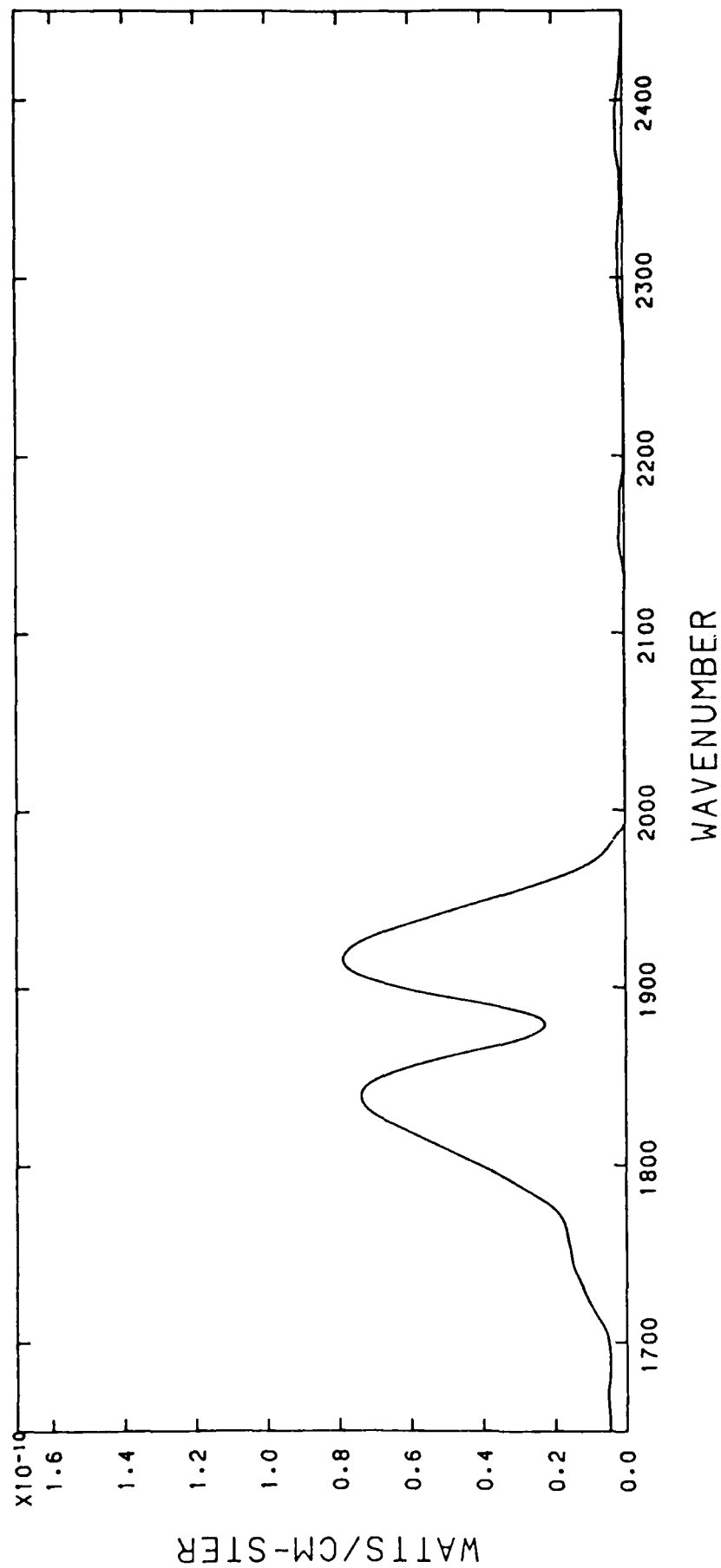


FILE 96, TIME 9:10:19.466, ALT 127.9-127.7 KM

30-NOV-83 09:32

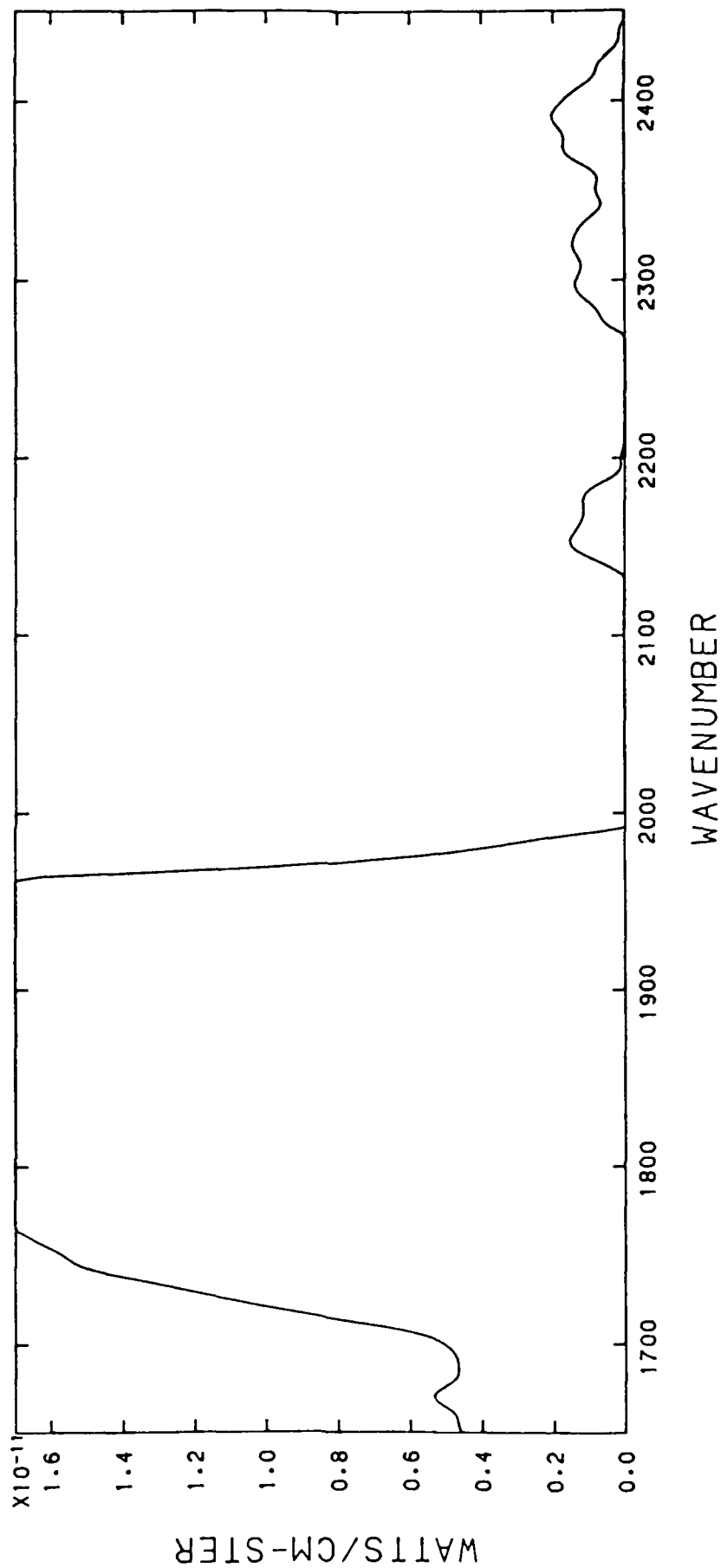


FILE 96, TIME 9:10:19.466, ALT 127.9-127.7 KM

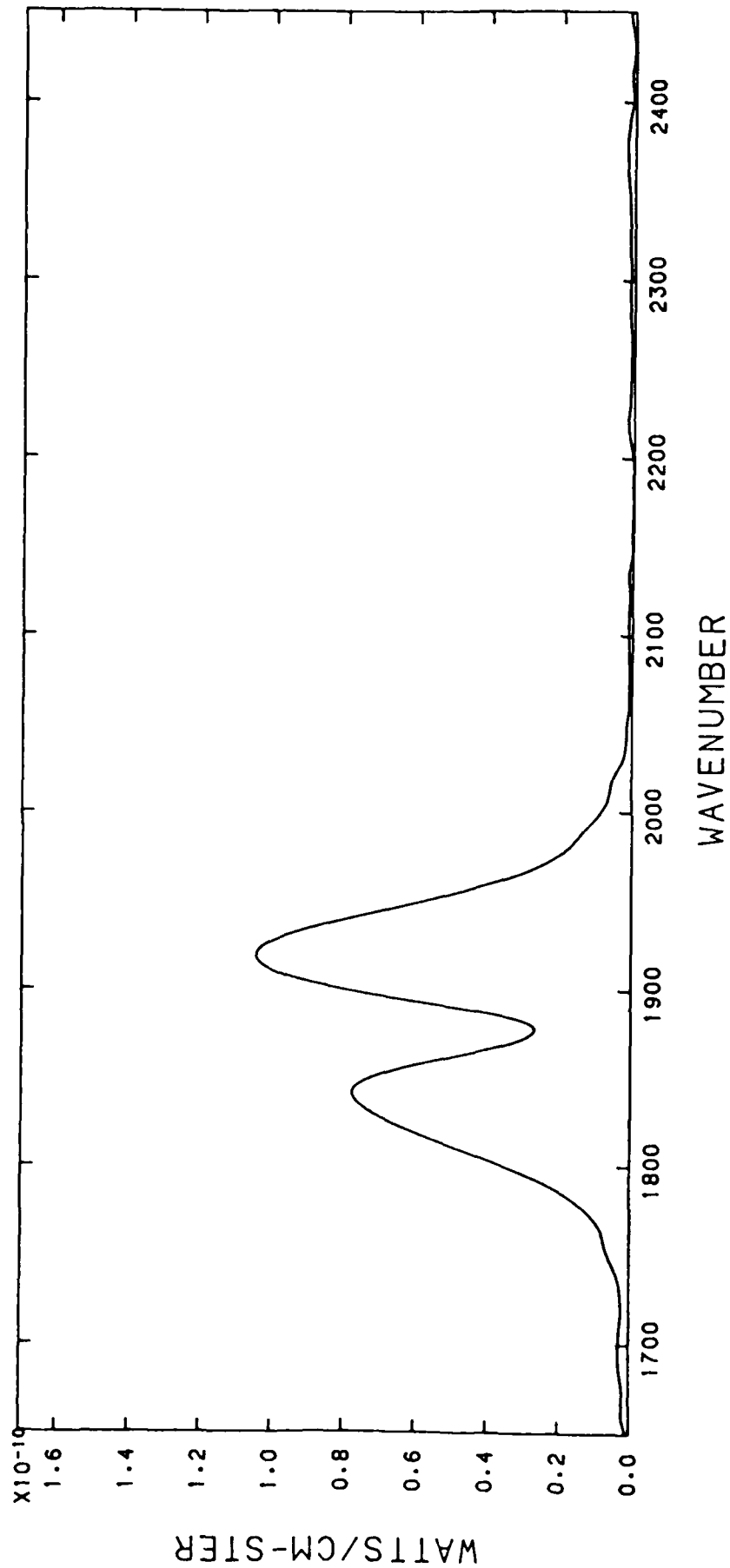


FILE 97, TIME 9:10:19.966, ALT 127.6-127.5 KM

30-NOV-83 09:32

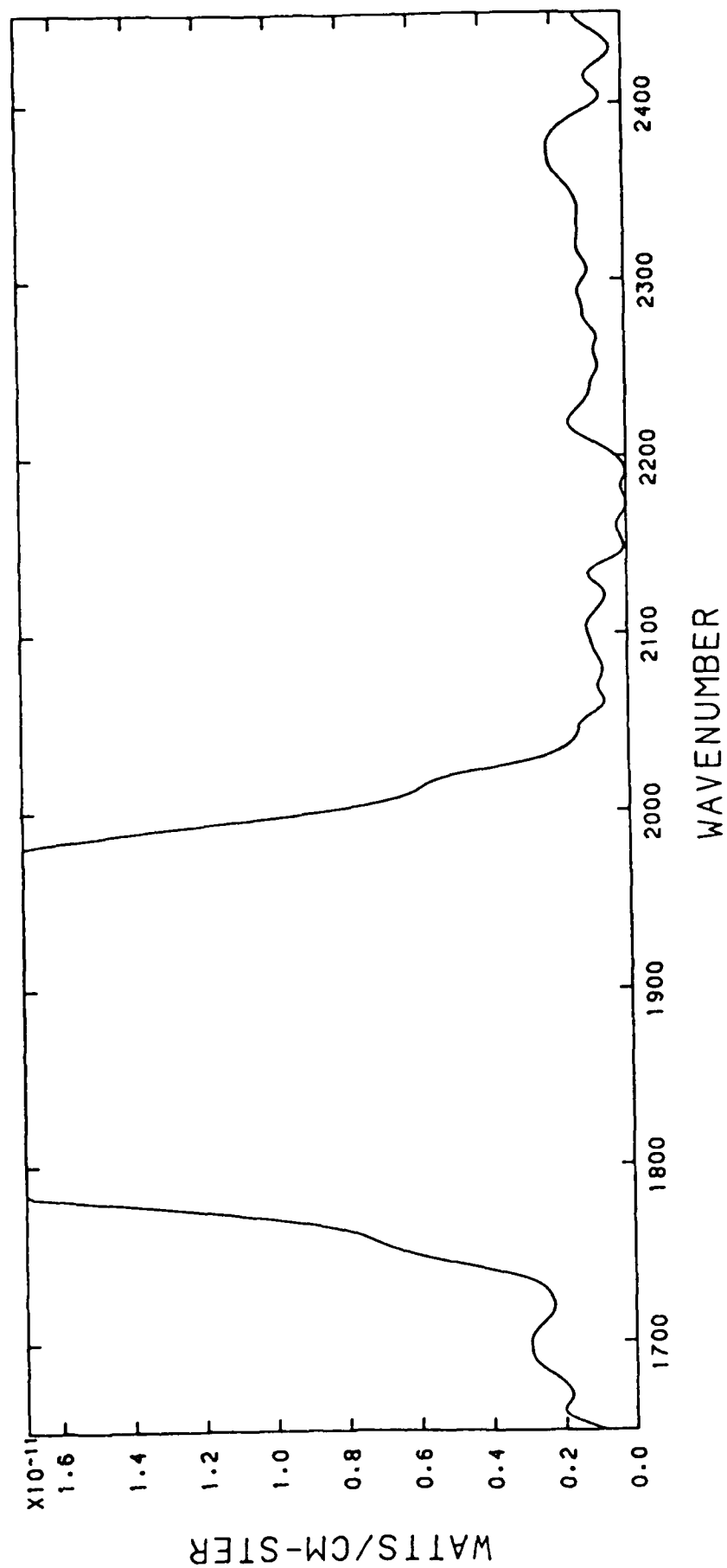


FILE 97. TIME 9:10:19.966, ALT 127.6-127.5 KM

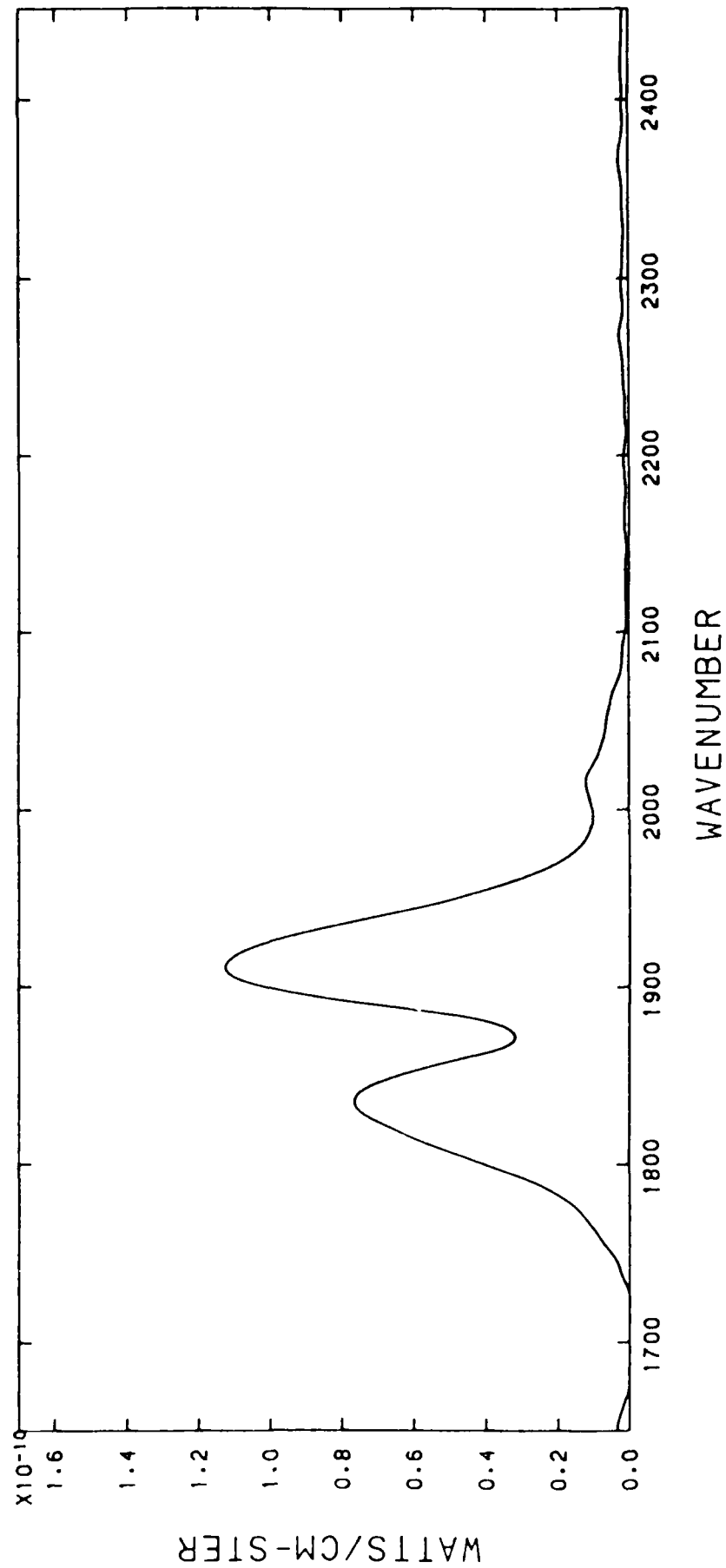


FILE 98, TIME 9:10:22.736, ALT 126.3-126.1 KM

30-NOV-83 09:33

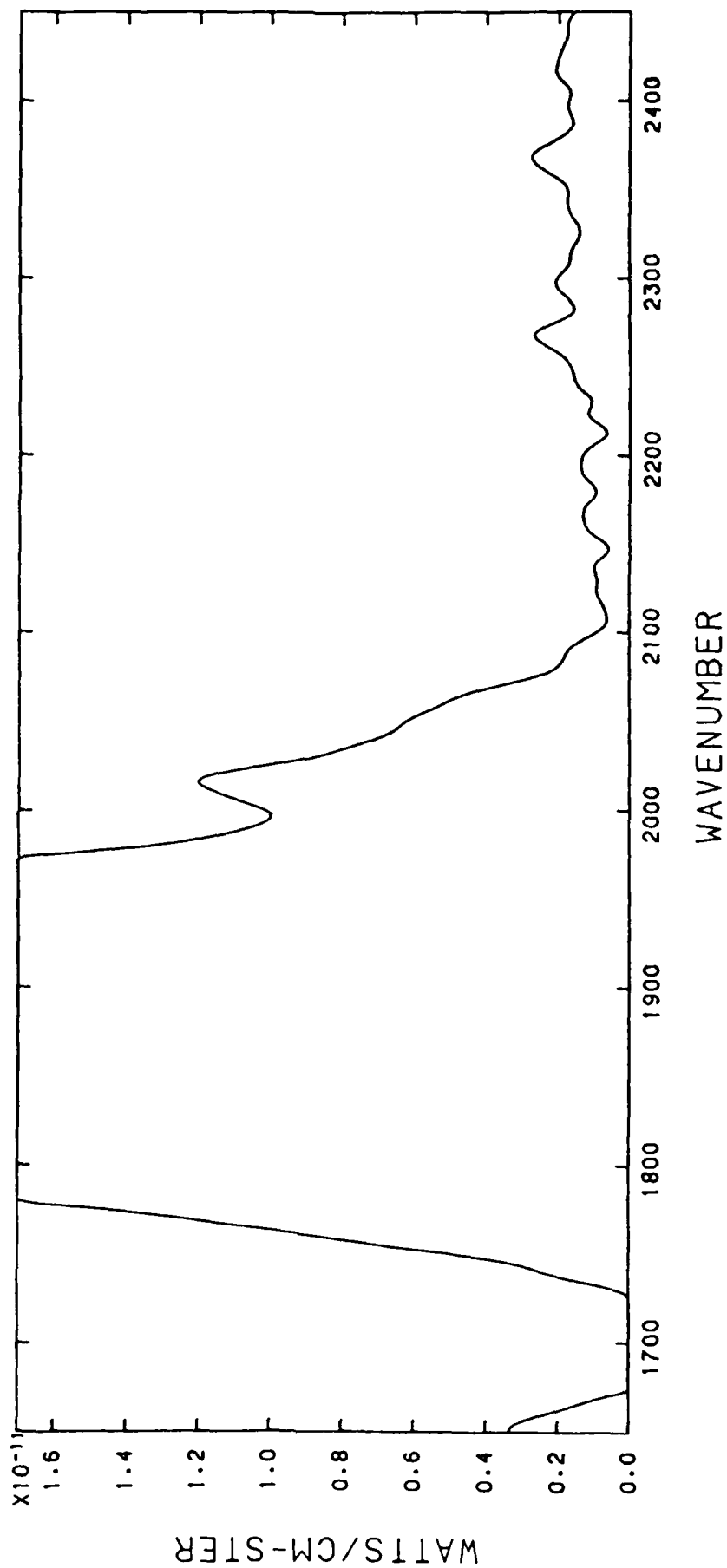


FILE 98, TIME 9:10:22.736, ALT 126.3-126.1 KM



FILE 99, TIME 9:10:23.234, ALT 126.1-125.9 KM

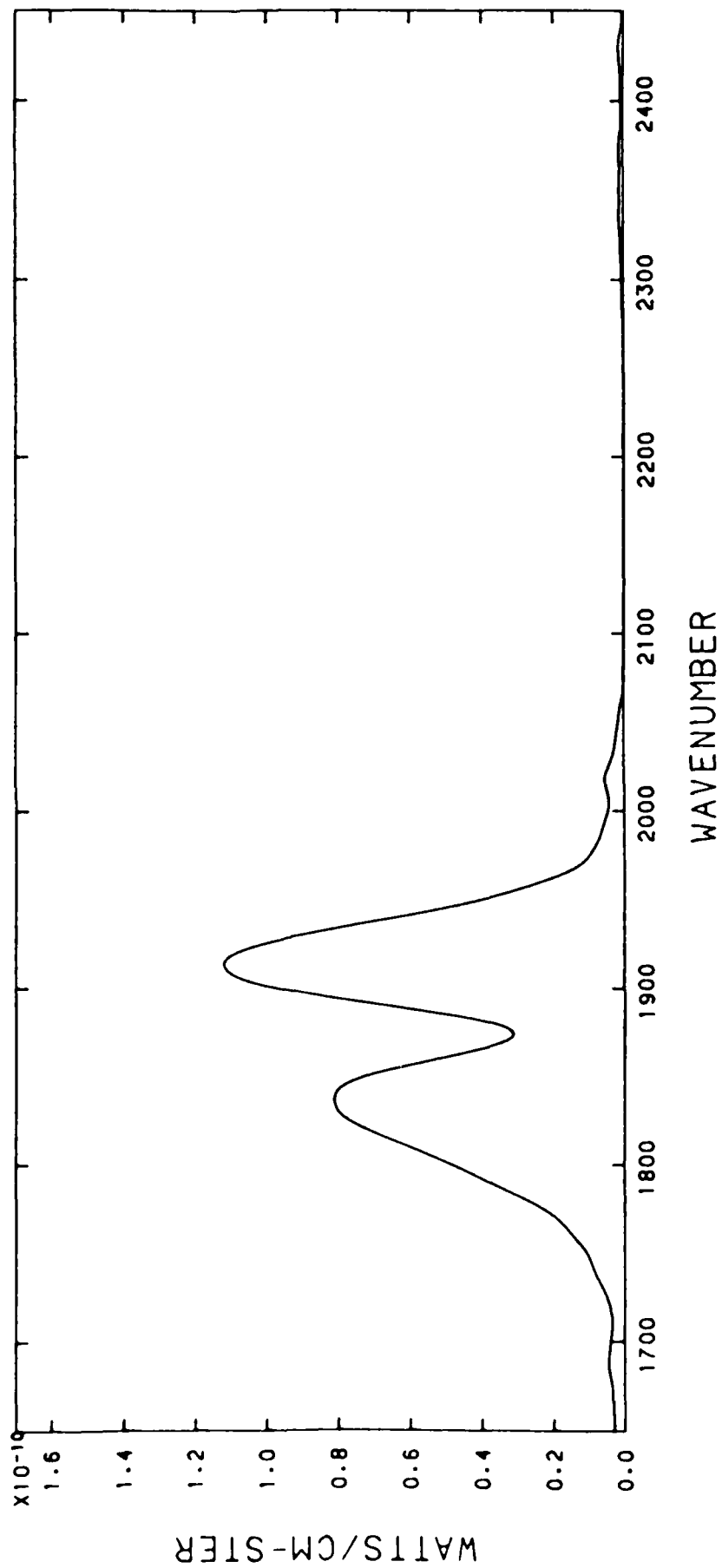
30-NOV-83 09:33



FILE 99, TIME 9:10:23.234, ALT 126.1-125.9 KM

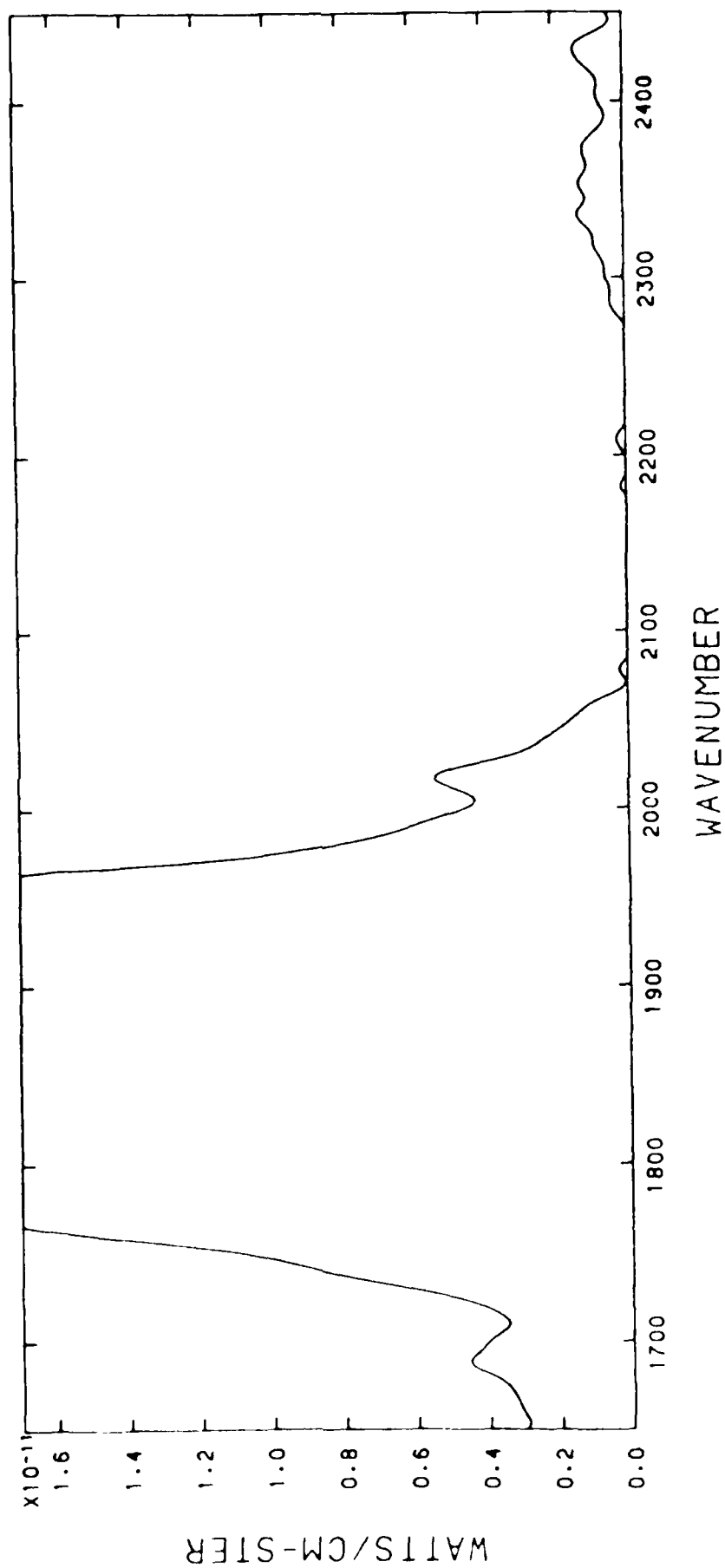
30-NOV-83 09:33



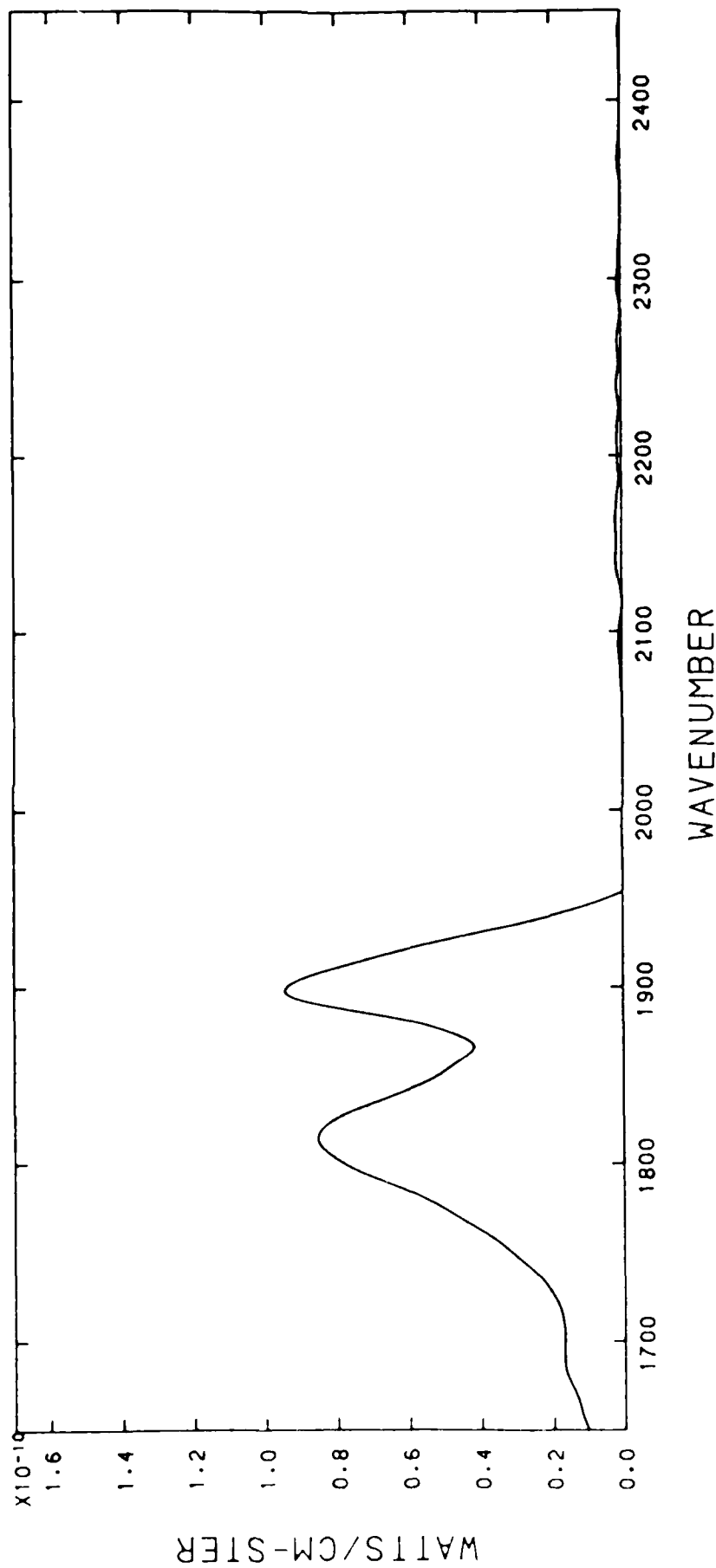


FILE 100. TIME 9:10:25.996. ALT 124.6-124.5 KM

30-NOV-83 09:33

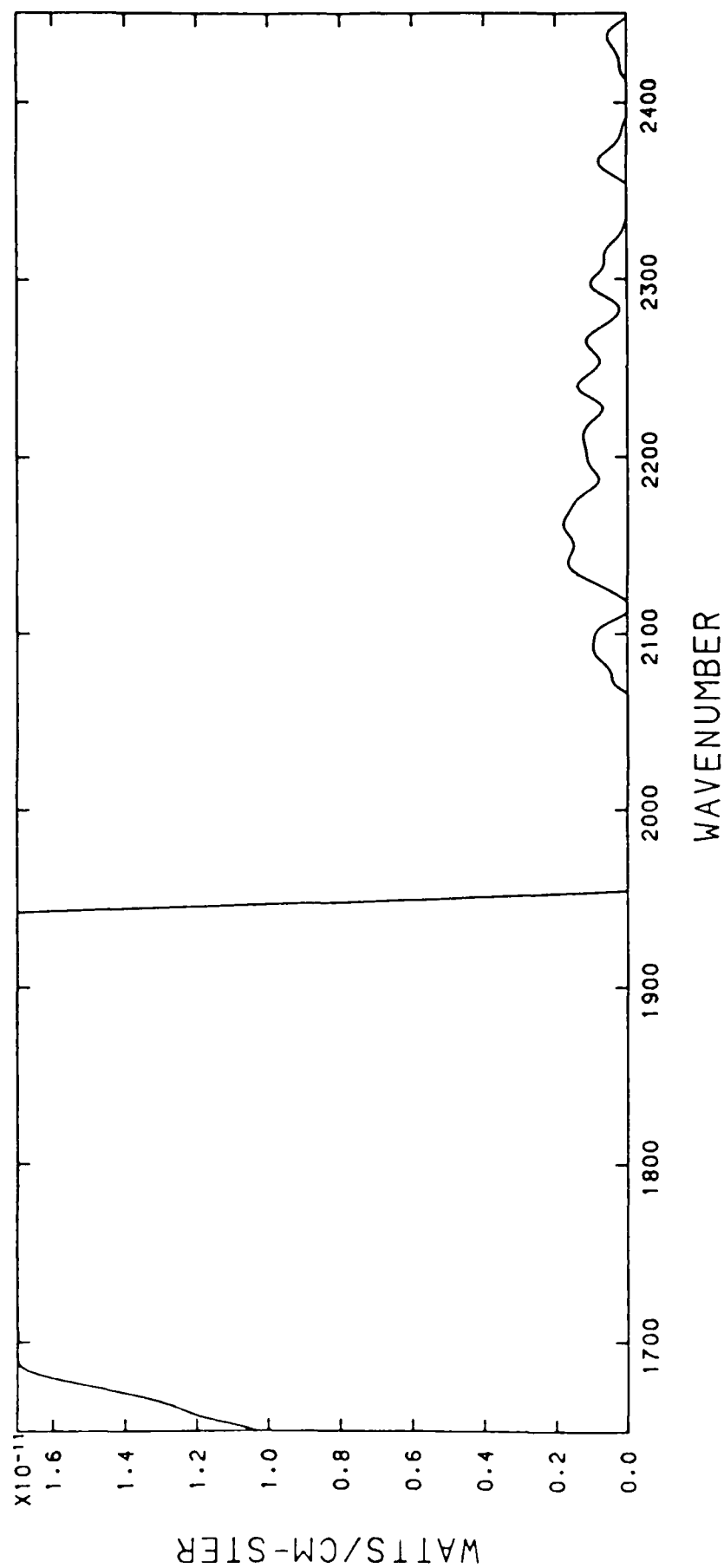


FILE 100, TIME 9:10:25.996, ALT 124.6-124.5 KM

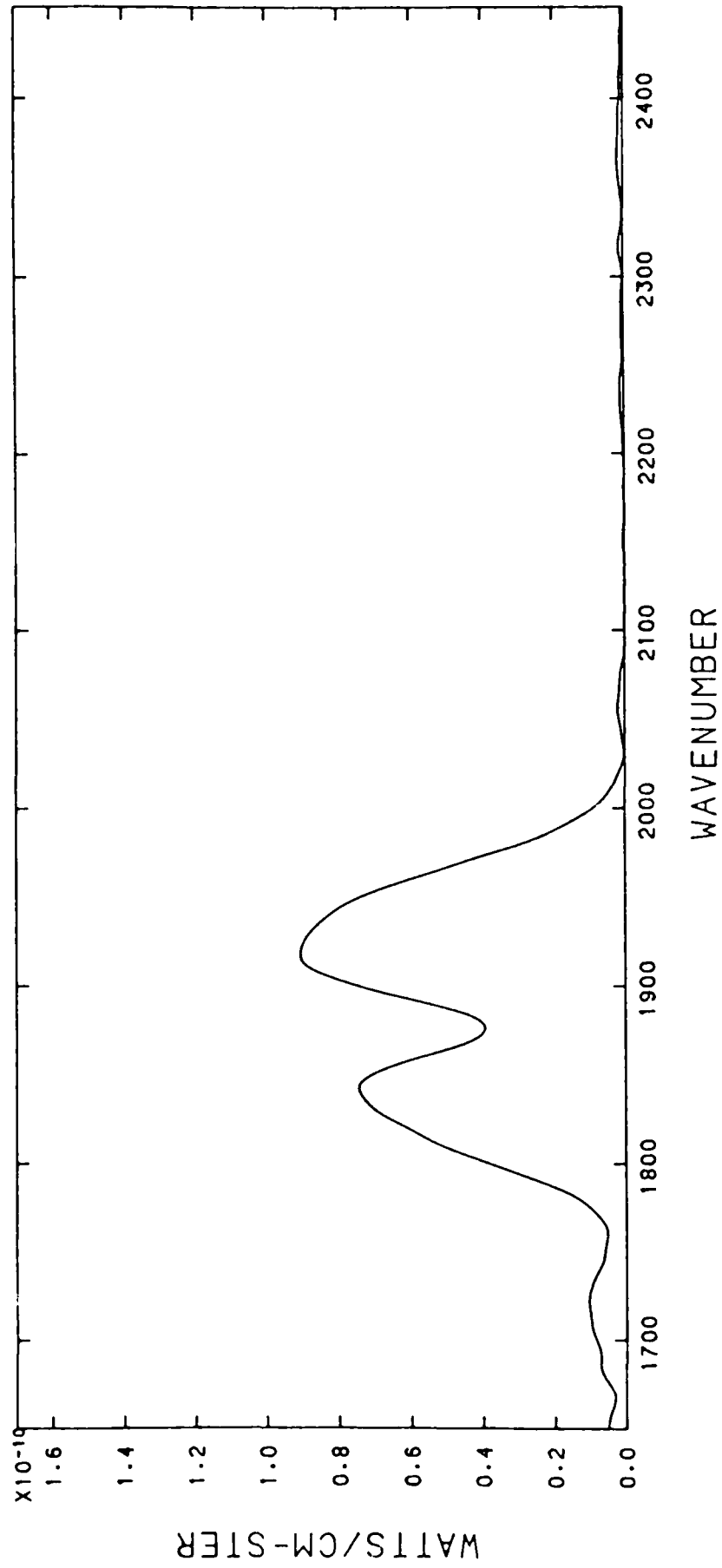


FILE 101, TIME 9:10:26.494, ALT 124.4-124.2 KM

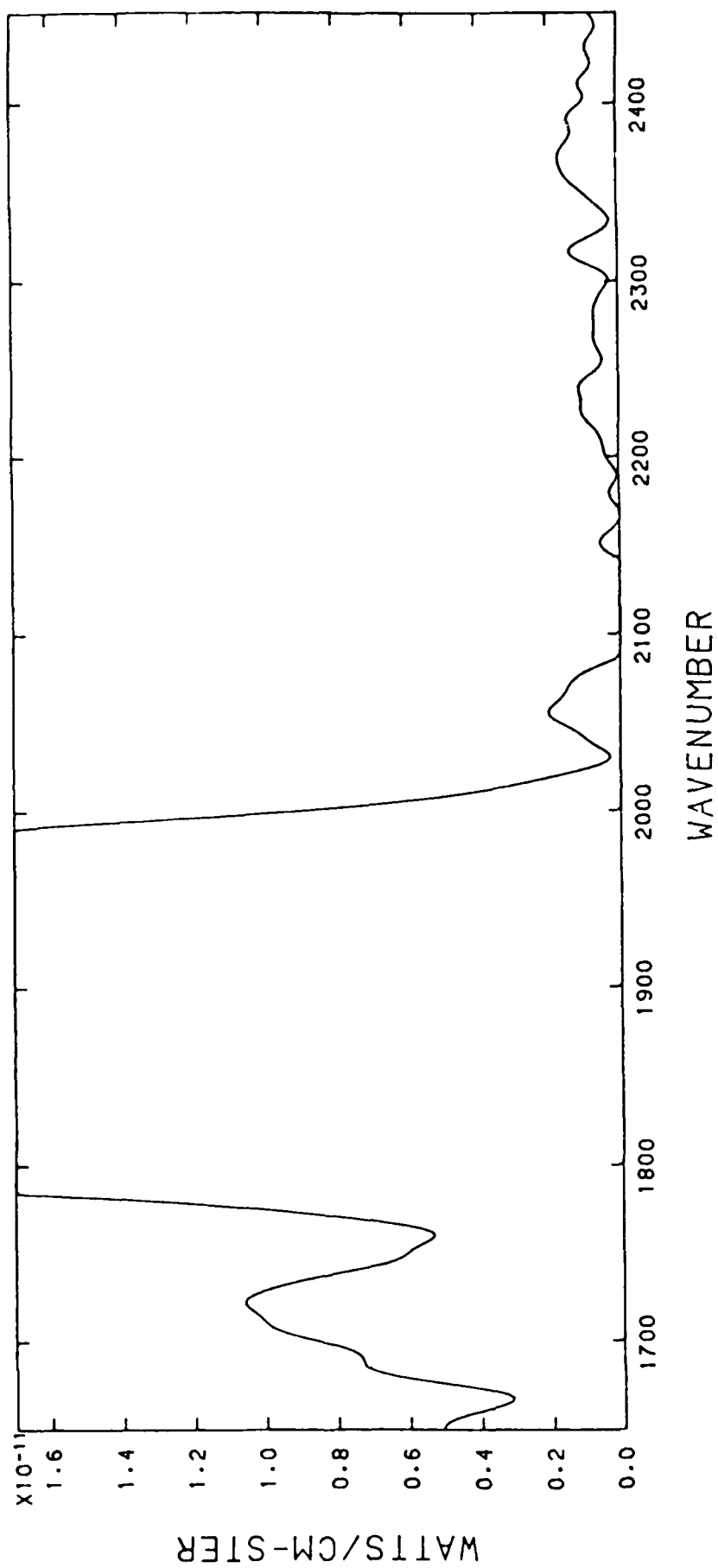
30-NOV-83 09:34



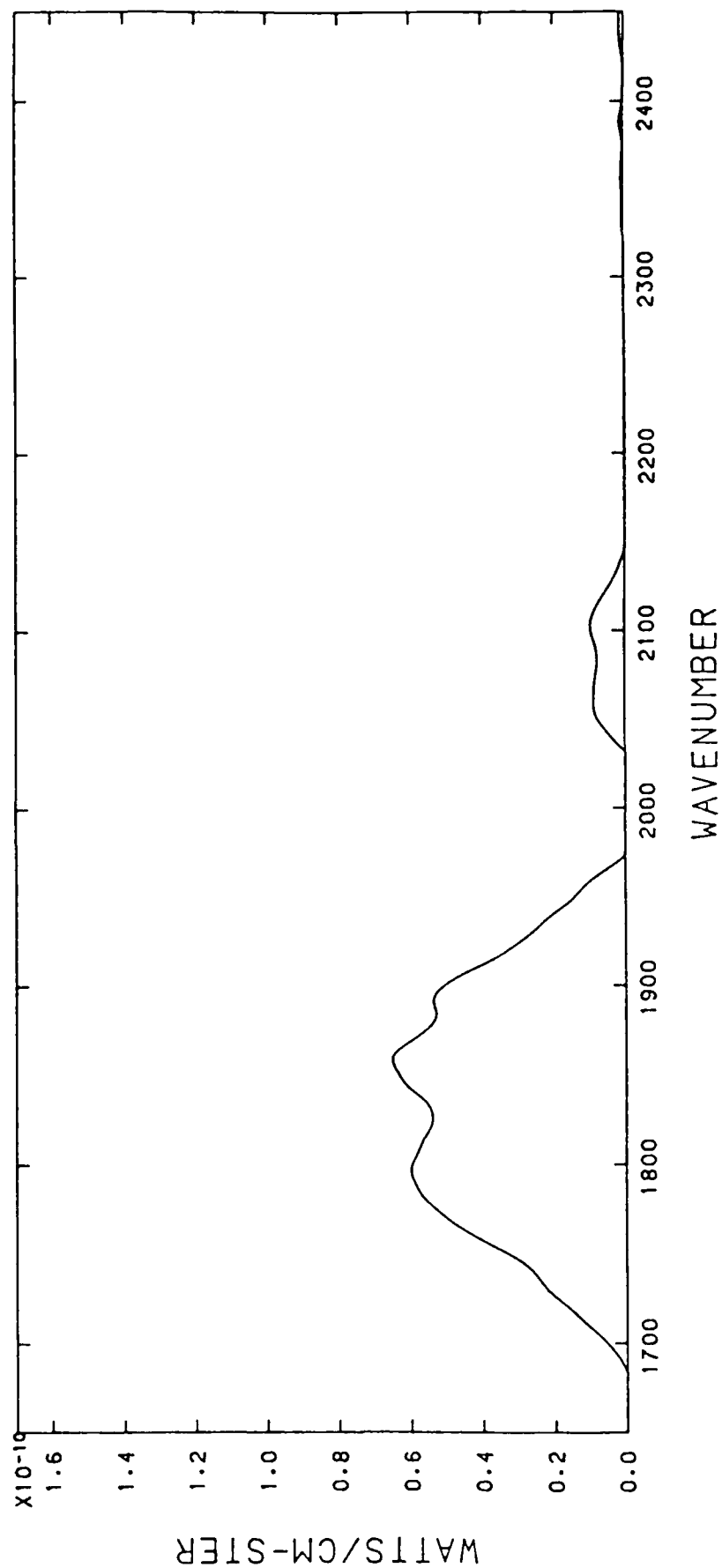
FILE 101, TIME 9:10:26.494, ALT 124.4-124.2 KM



FILE 102, TIME 9:10:29.256, ALT 122.9-122.7 KM

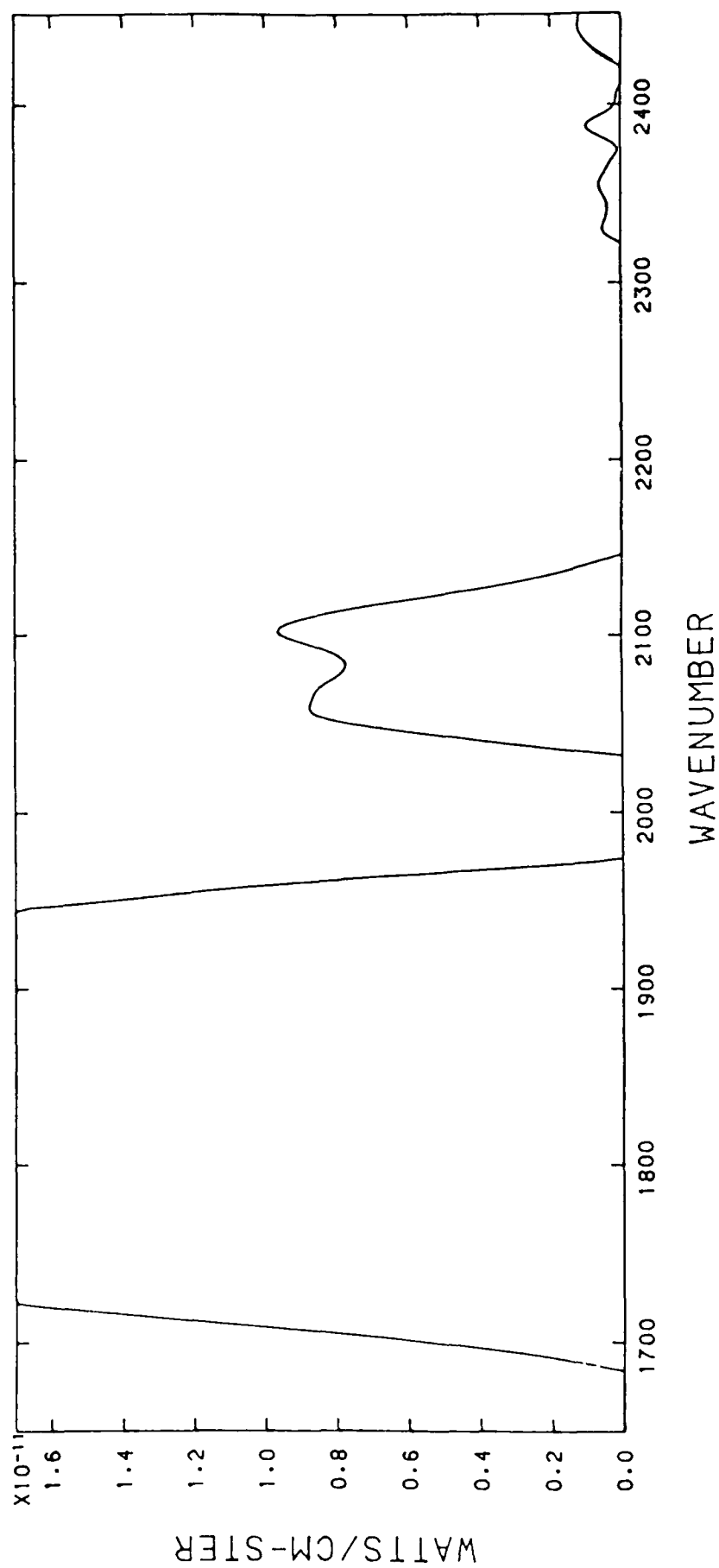


FILE 102, TIME 9:10:29.256, ALT 122.9-122.7 KM



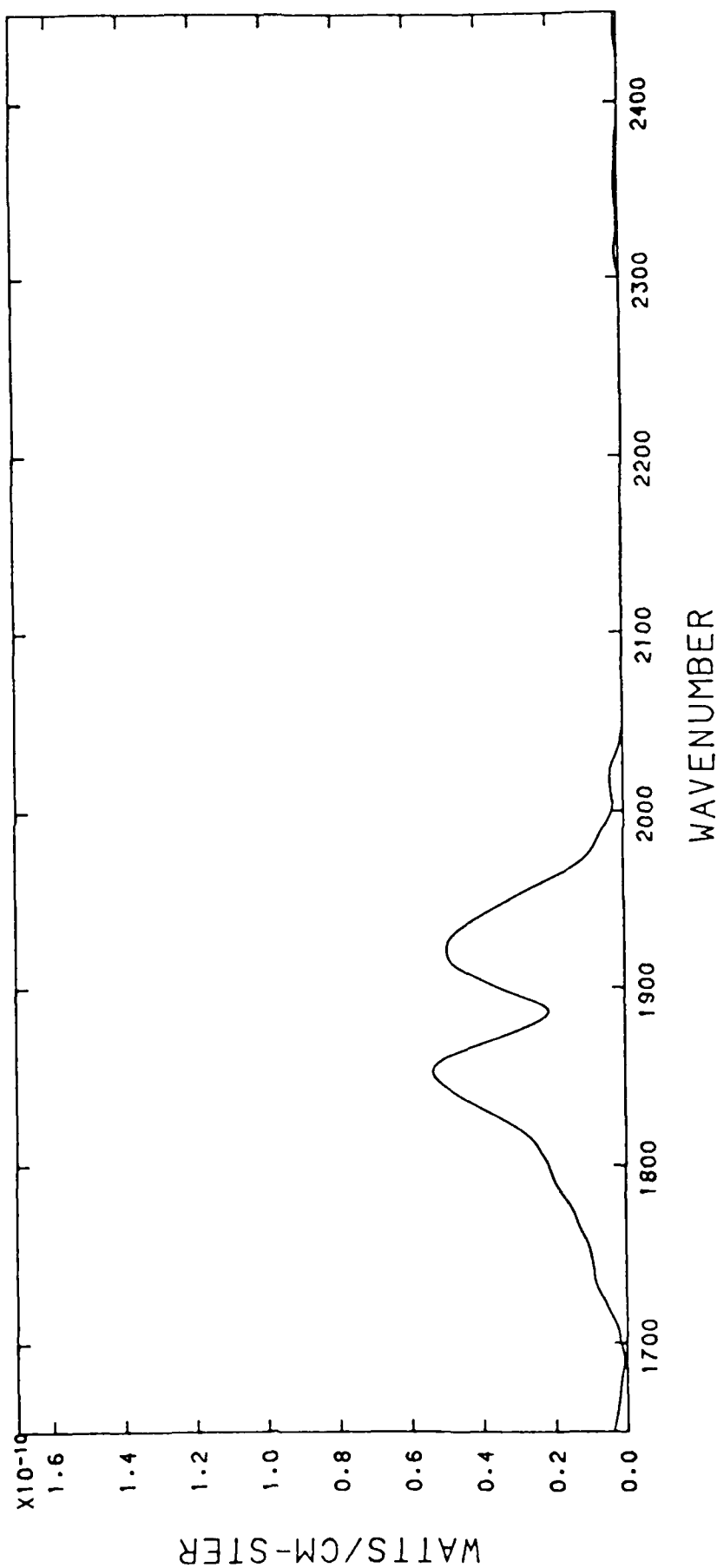
FILE 103, TIME 9:10:29.754, ALT 122.6-122.4 KM

30-NOV-83 09:34



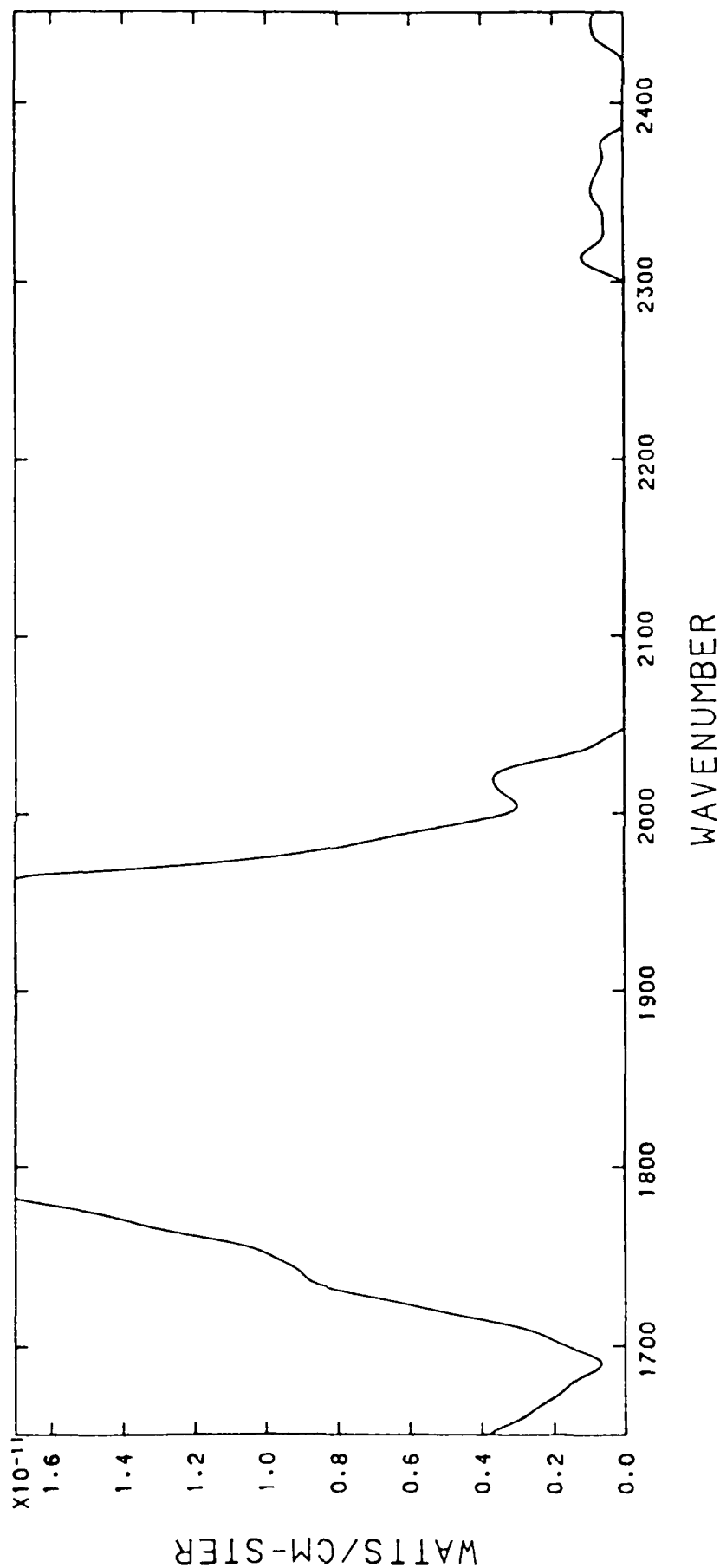
FILE 103, TIME 9:10:29.754, ALT 122.6-122.4 KM





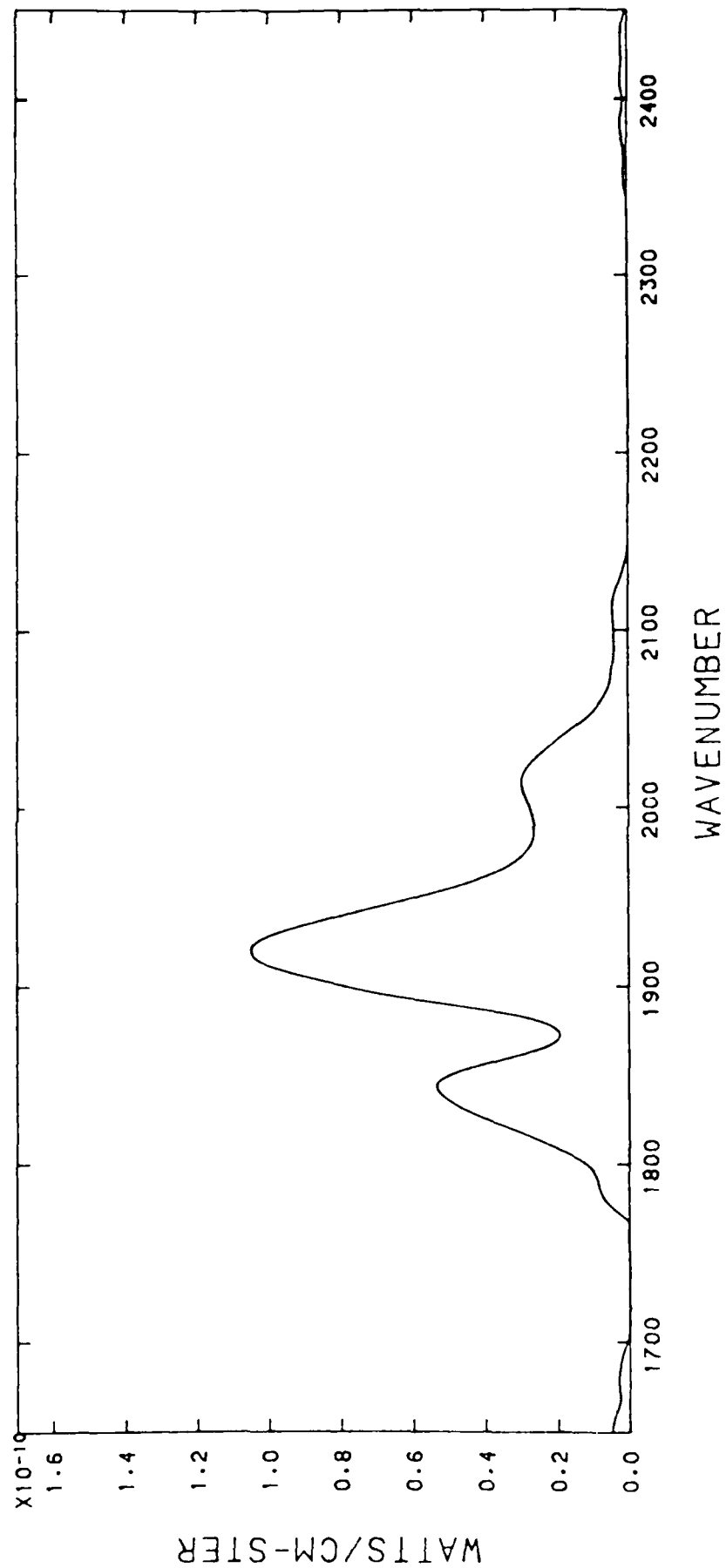
FILE 104, TIME 9:10:32.526, ALT 121.0-120.8 KM

30-NOV-83 09:34



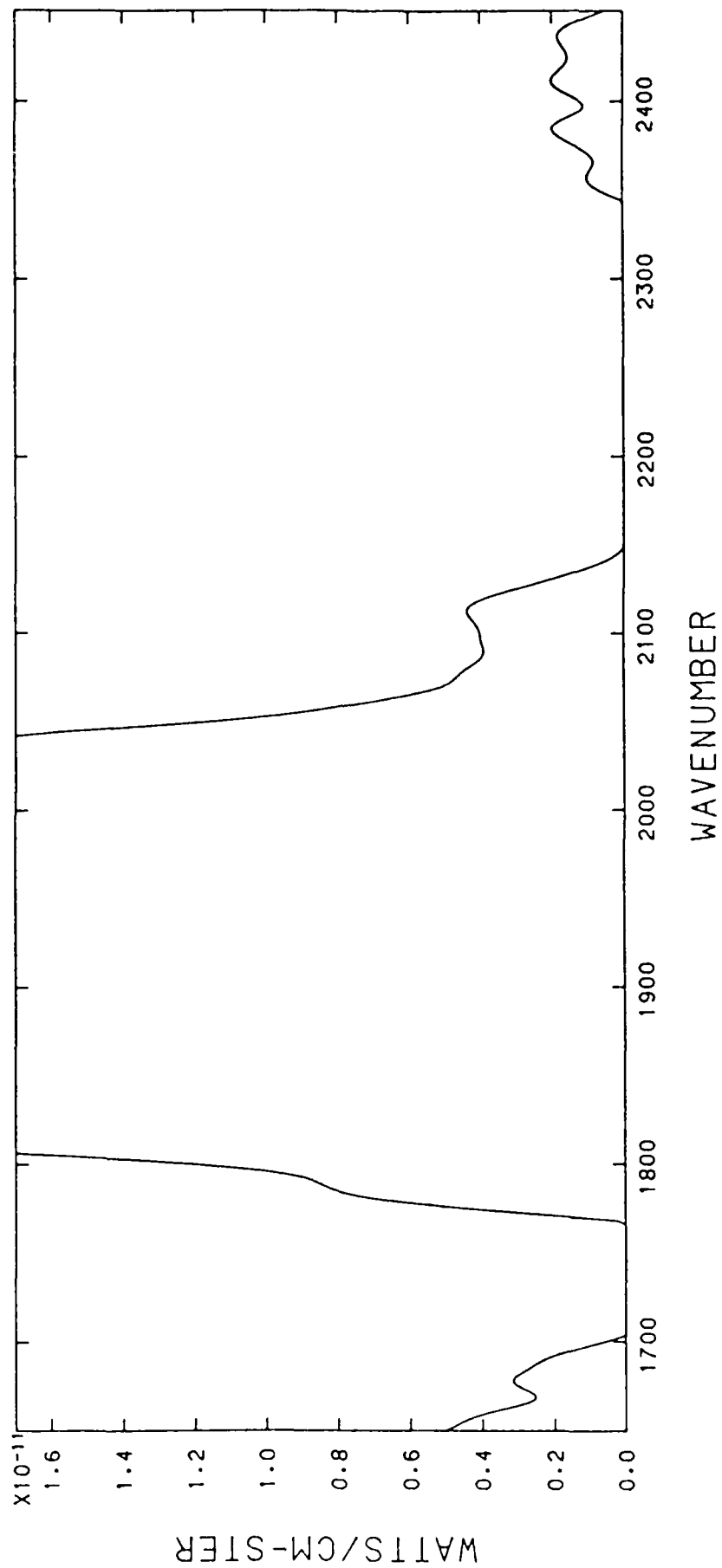
FILE 104, TIME 9:10:32.526, ALT 121.0-120.8 KM

30-NOV-83 09:34

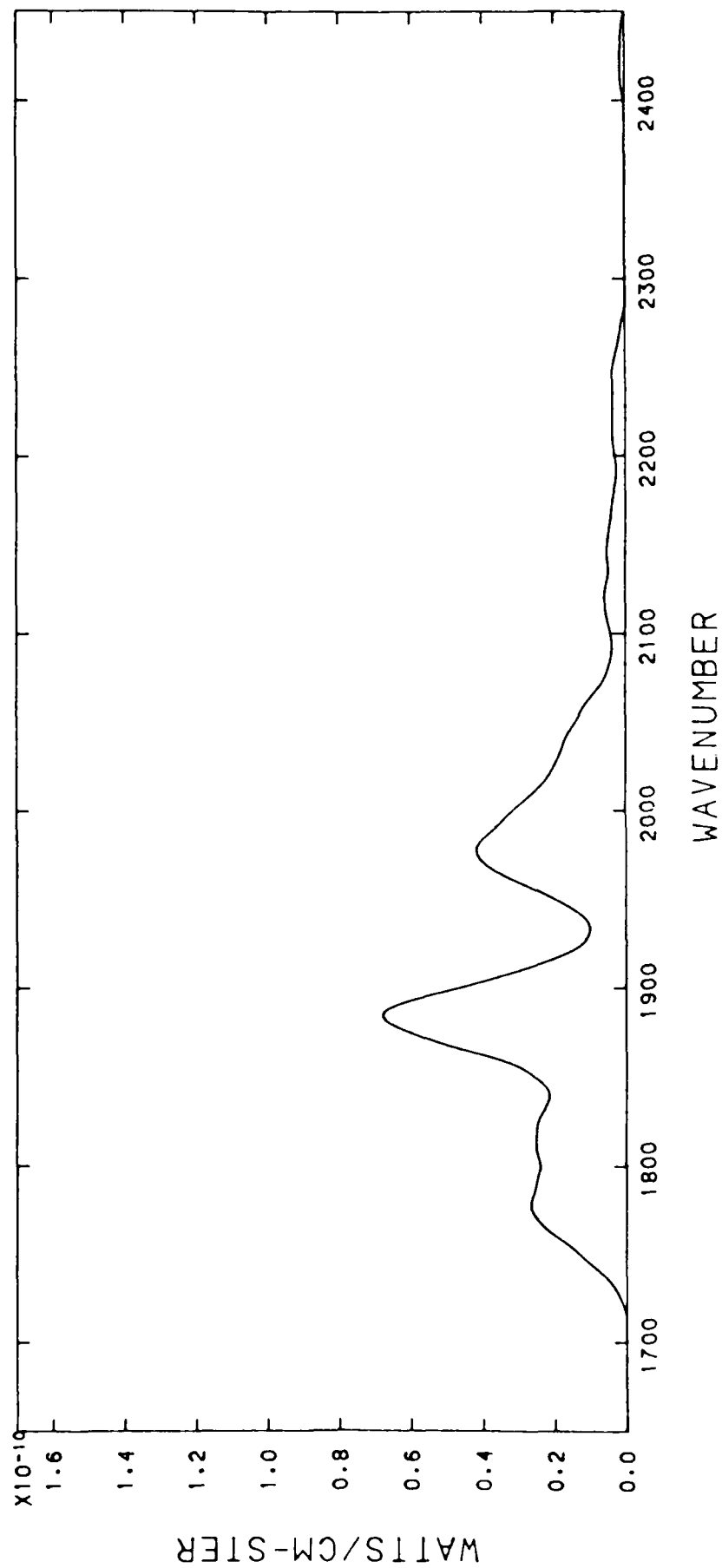


FILE 105, TIME 9:10:33. 24, ALT 120.7-120.5 KM

30-NOV-83 09:34

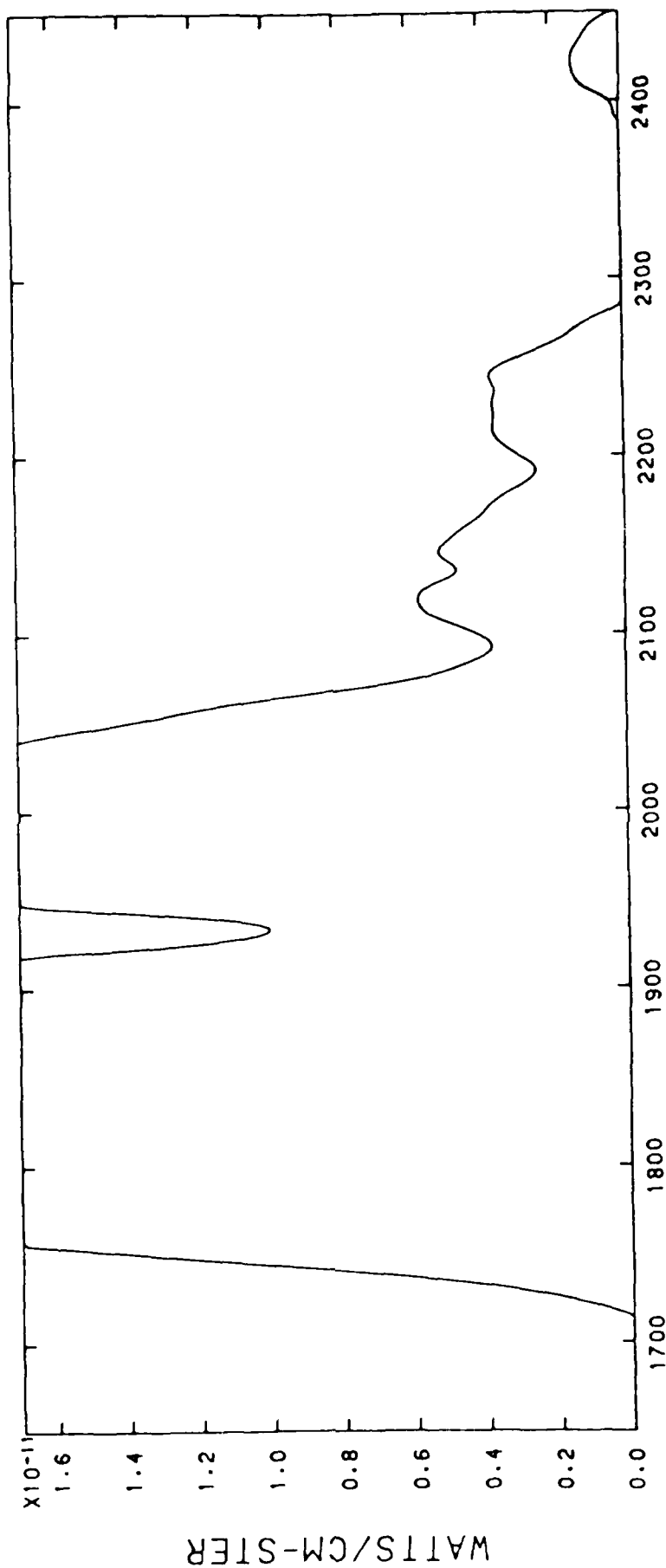


FILE 105, TIME 9:10:33. 24, ALT 120.7-120.5 KM



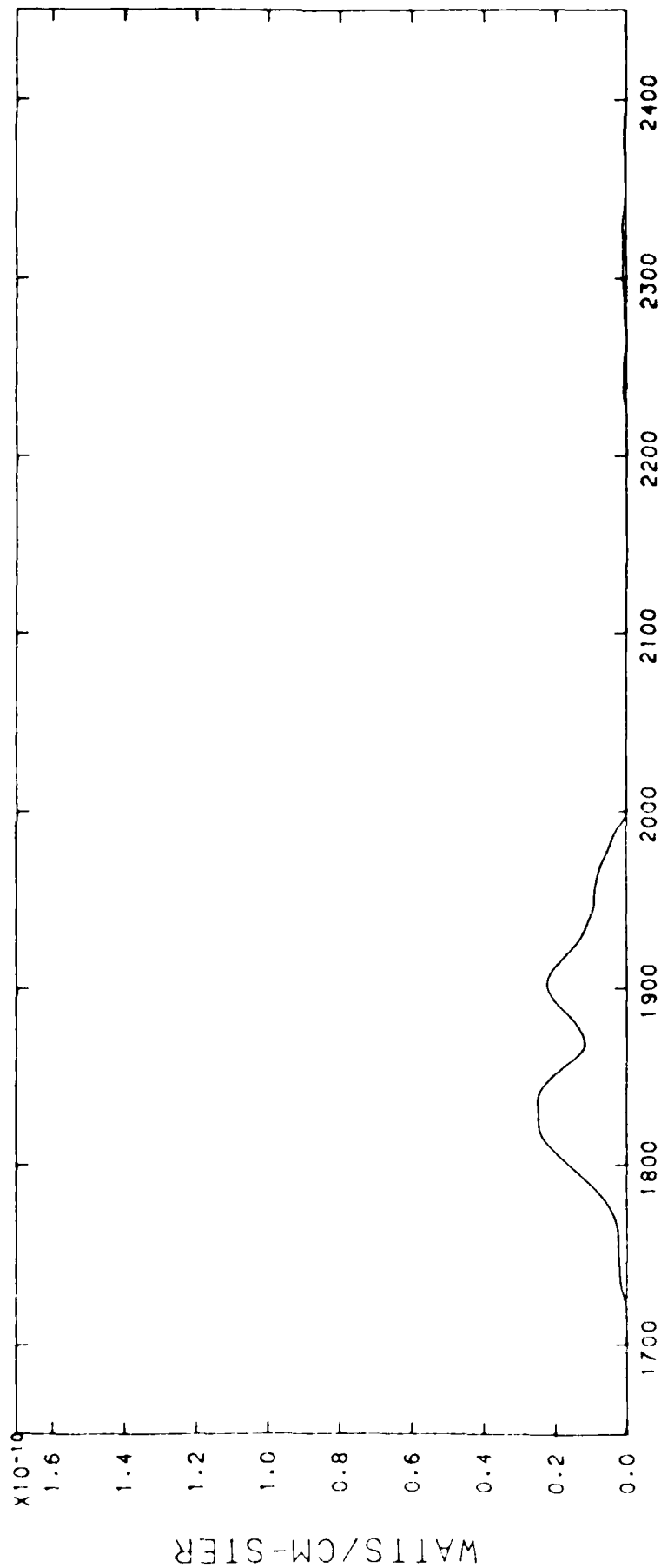
FILE 106, TIME 9:10:35.784, ALT 119.1-118.8 KM

30-NOV-83 09:34



WAVENUMBER

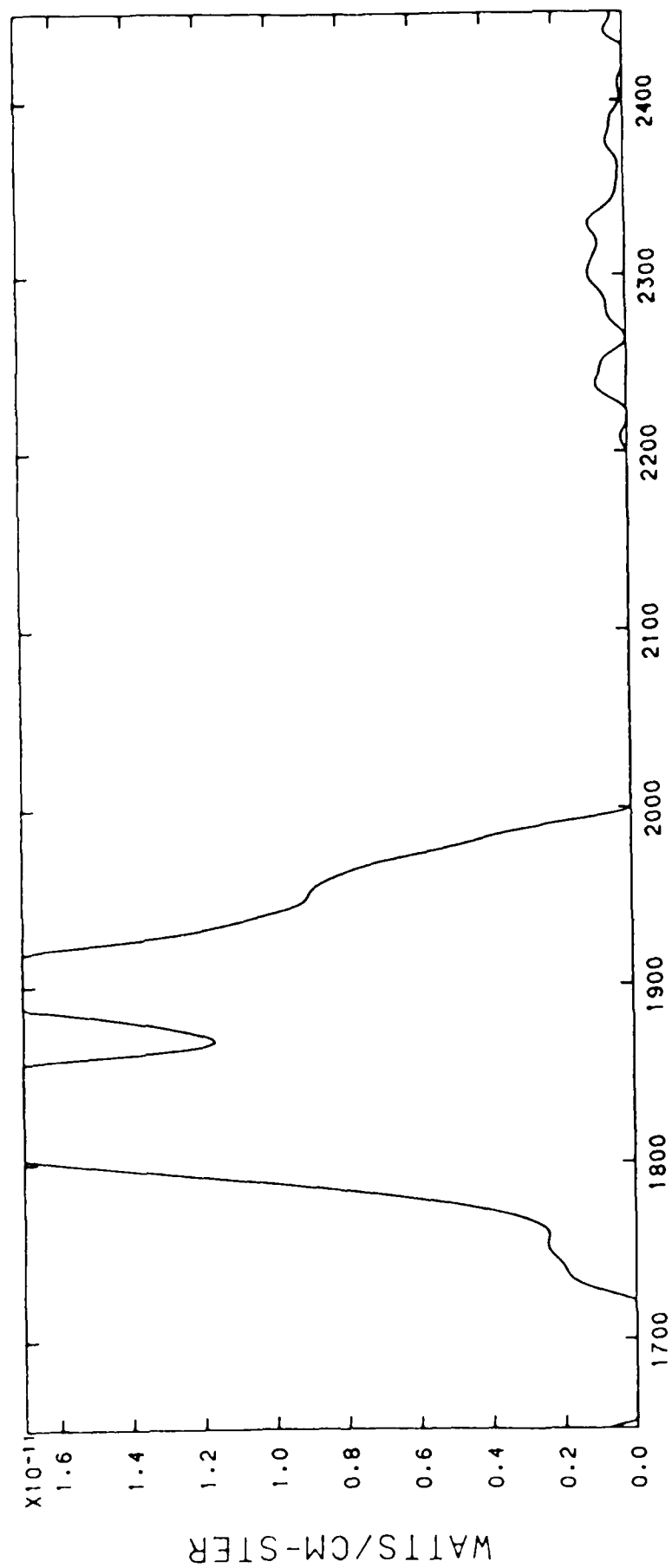
FILE 106, TIME 9:10:35.784, ALT 119.1-118.8 KM



WAVENUMBER

FILE 107, TIME 9:10:36.274, ALT 118.7-118.5 KM

30-NOV-83 09:34

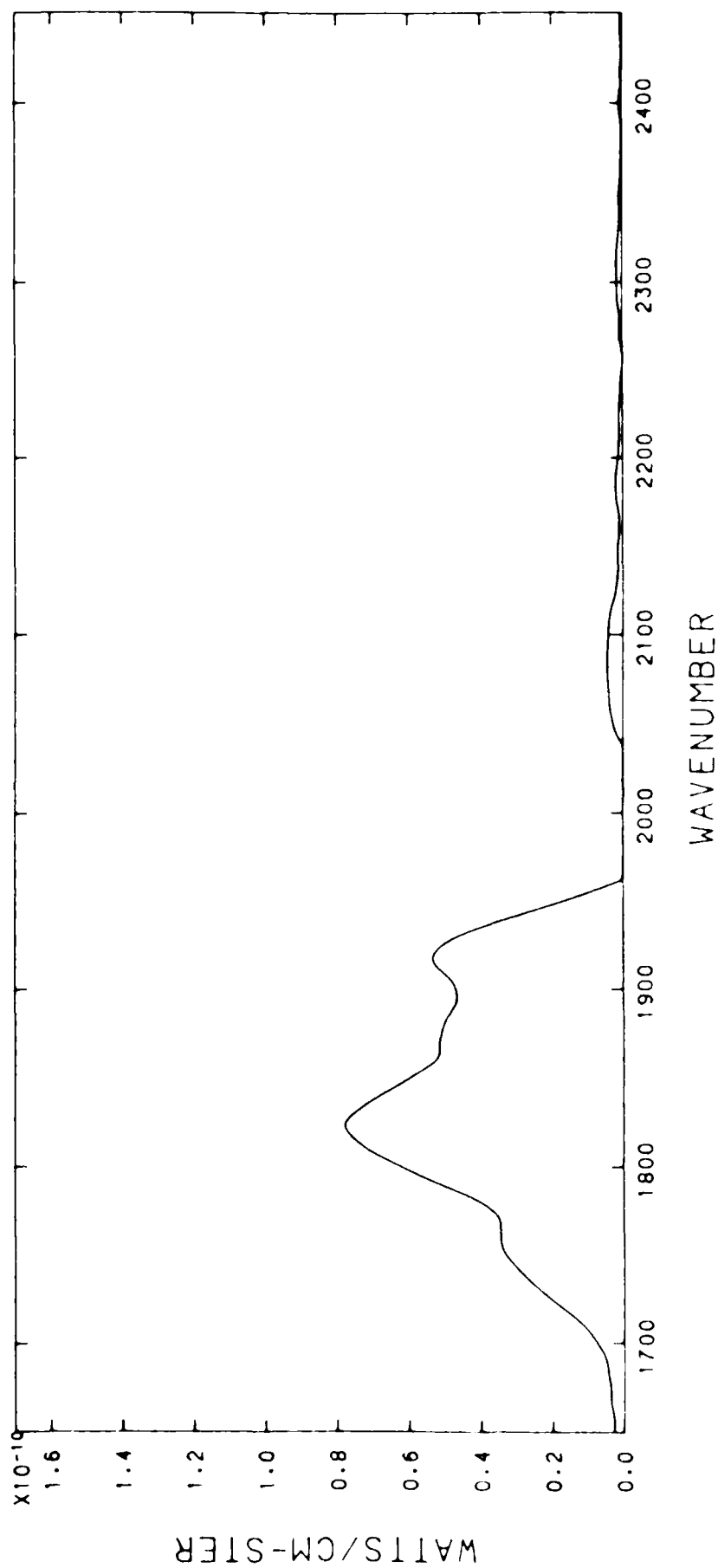


WAVENUMBER

FILE 107, TIME 9:10:36.274, ALT 118.7-118.5 KM

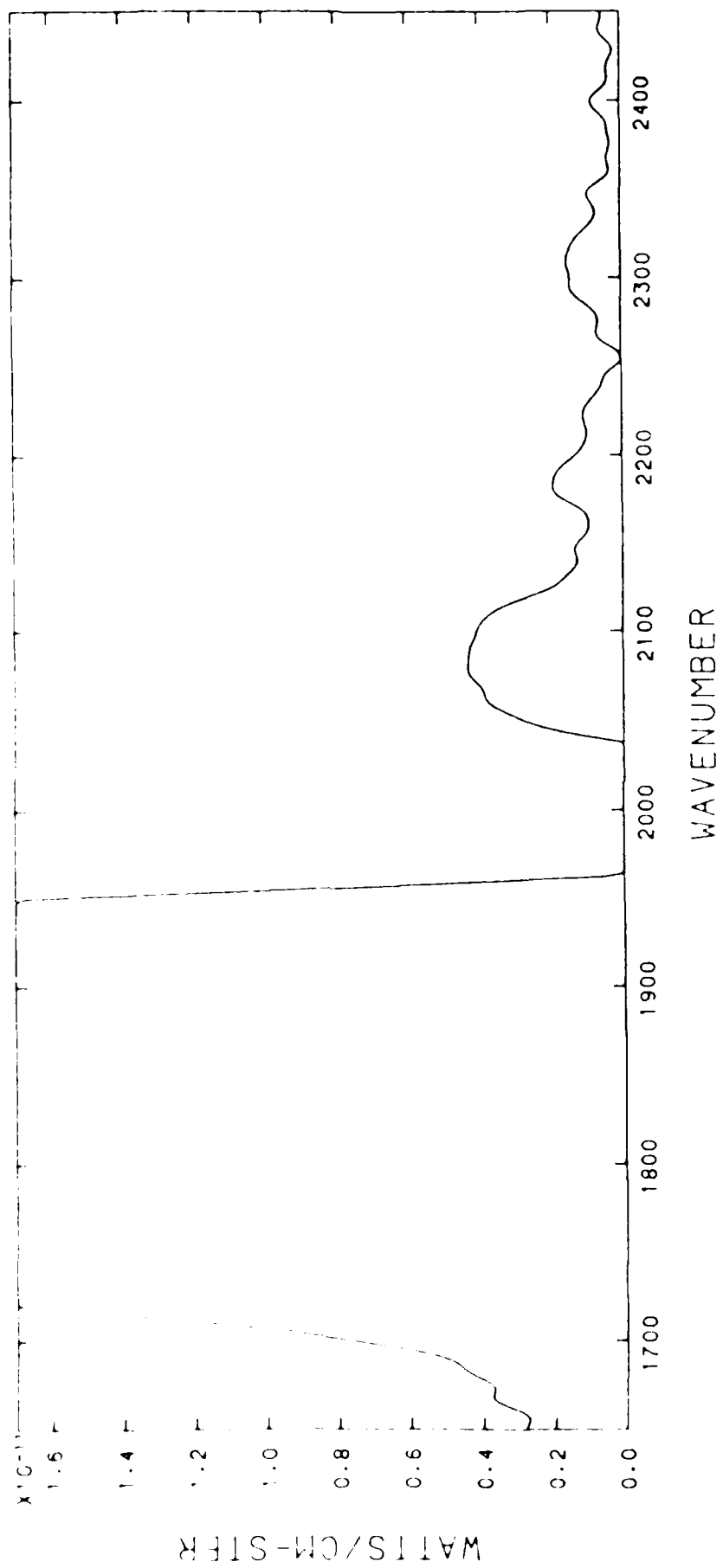
30-NOV-83 09:34



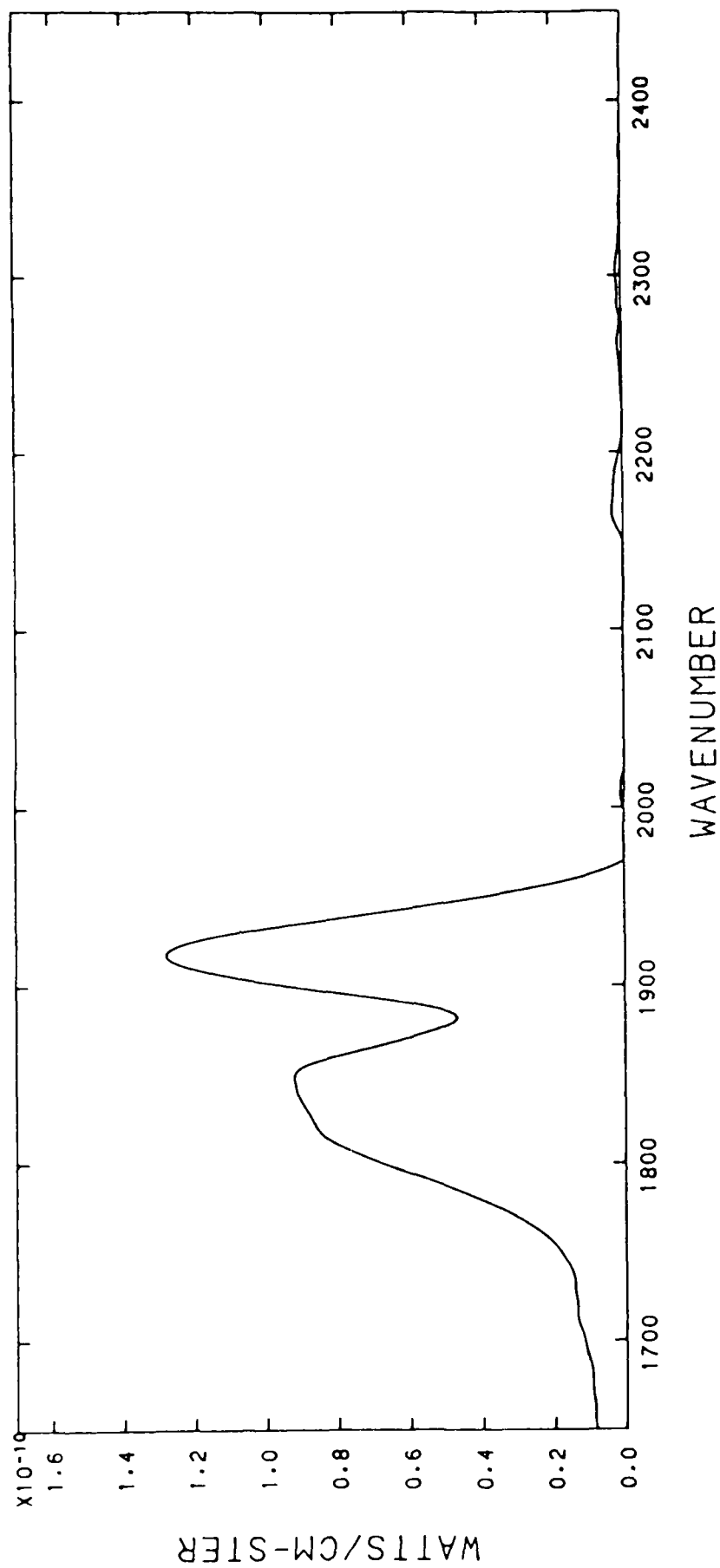


FILE 108. TIME 9:10:39. 40. ALT 117.0-116.8 KM

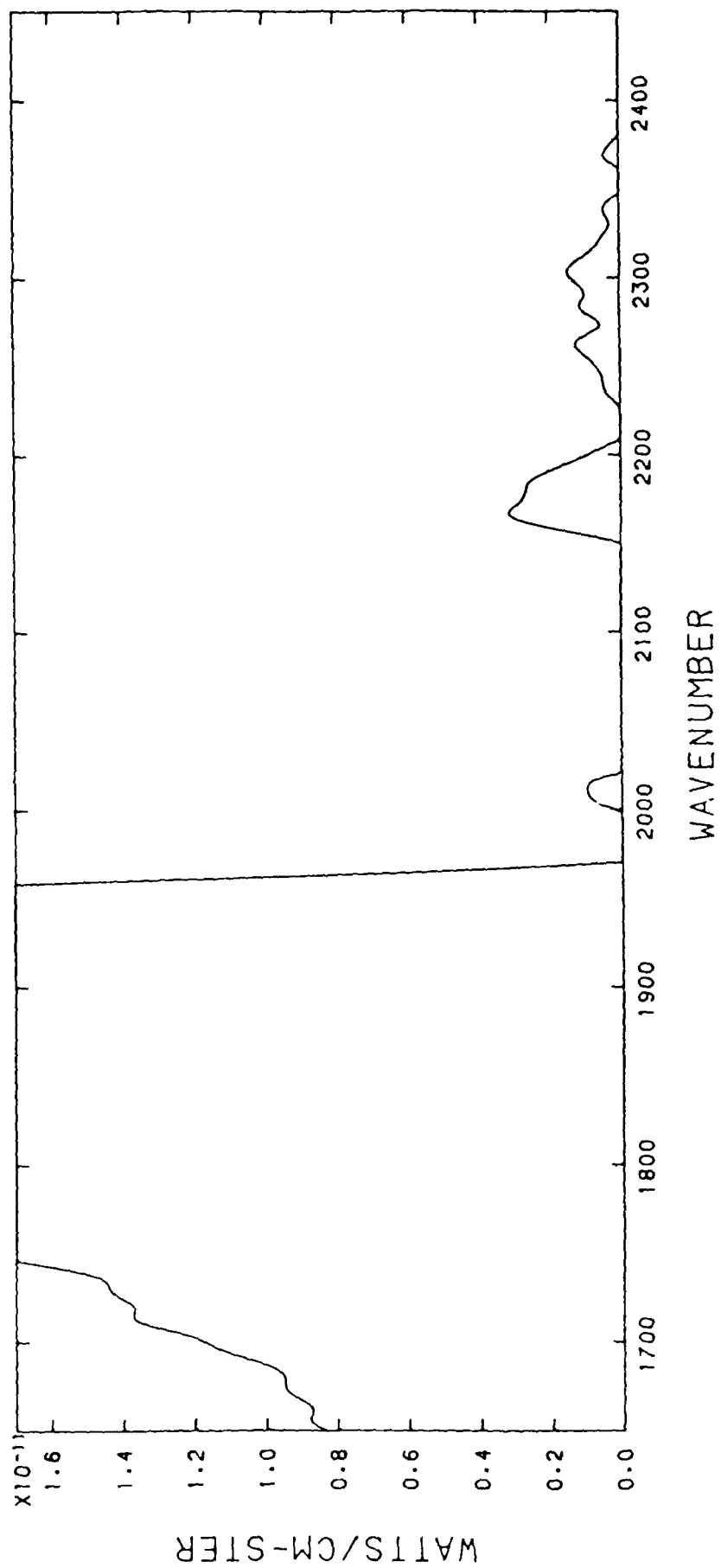
30-NOV-83 09:34



FILE 108, TIME 9:10:39. 40, ALT 117.0-116.8 KM

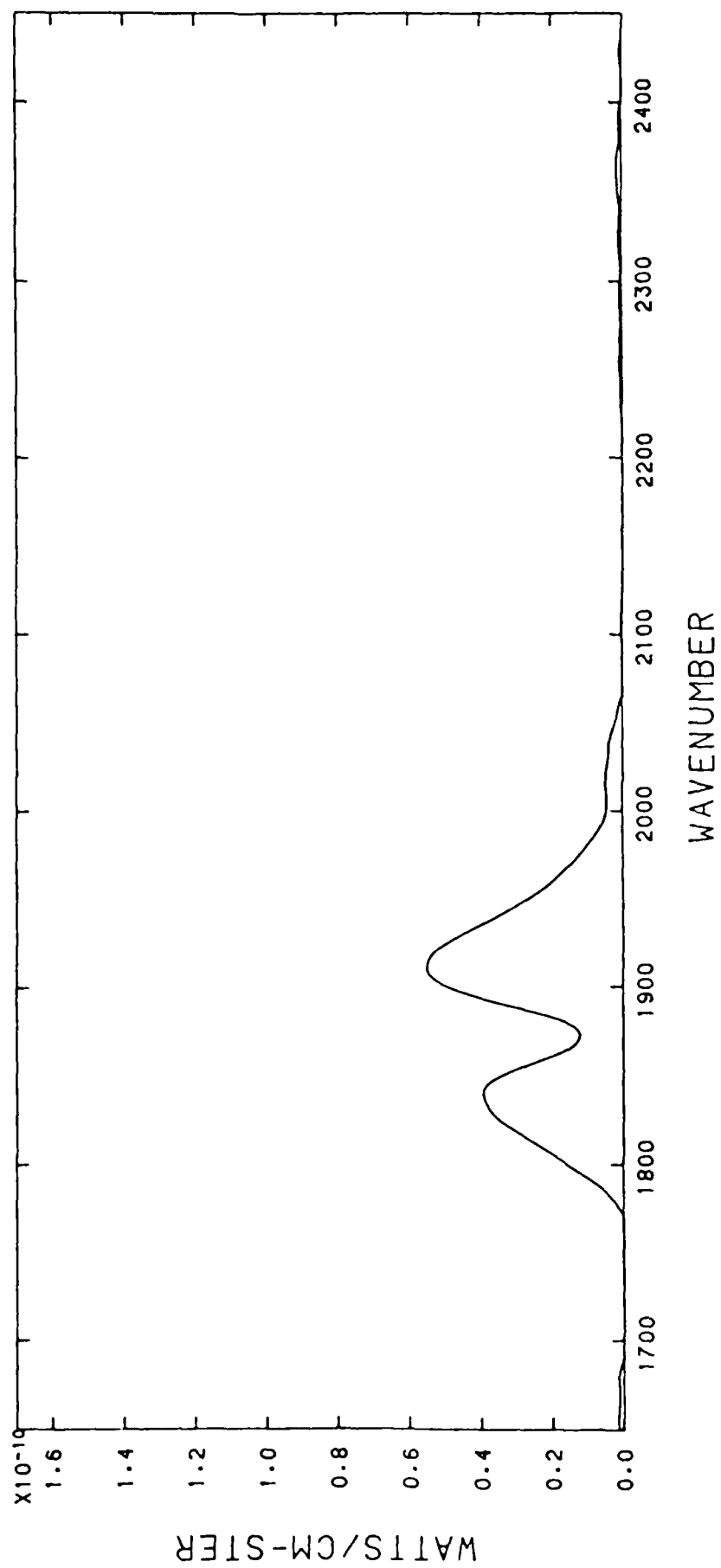


FILE 109, TIME 9:10:39.538, ALT 116.7-116.4 KM

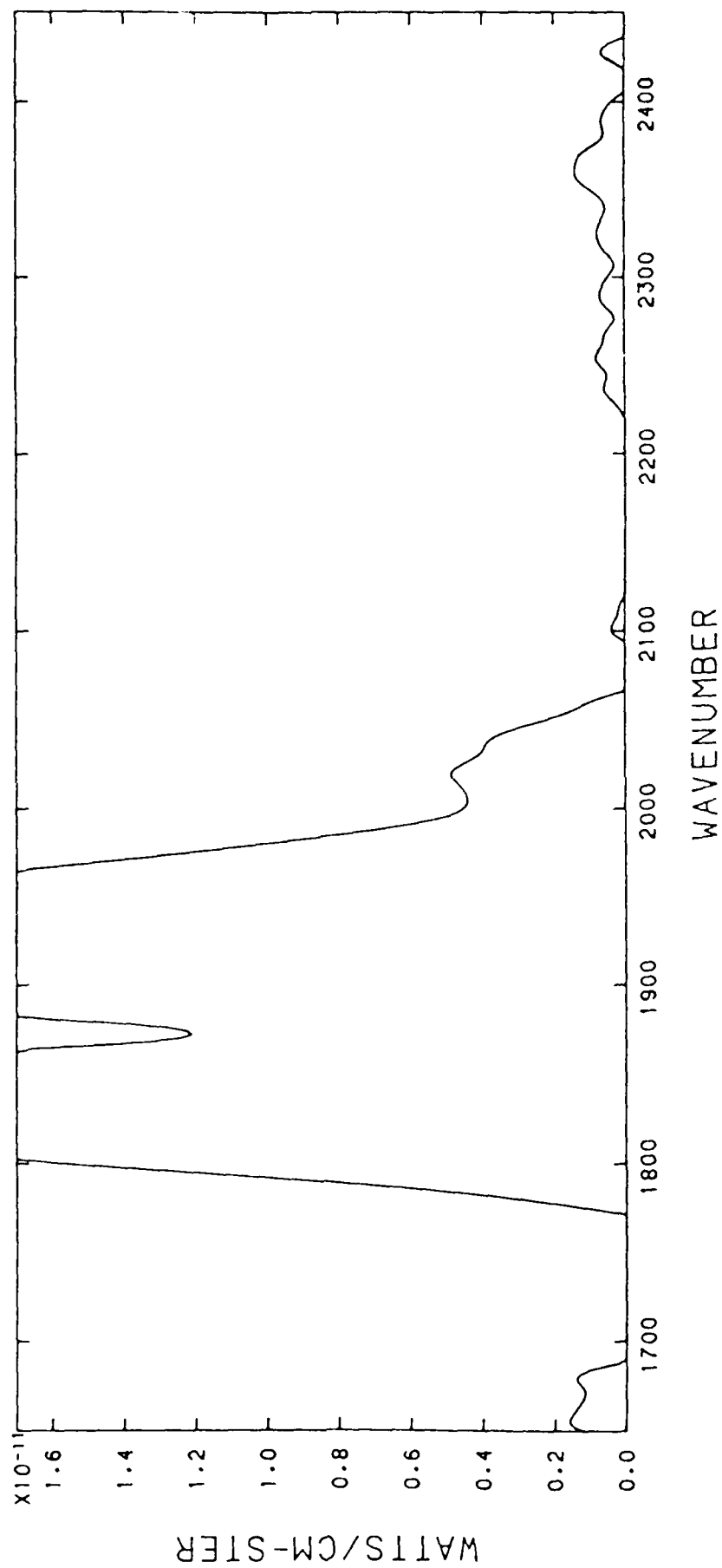


FILE 109, TIME 9:10:39.538, ALT 116.7-116.4 KM

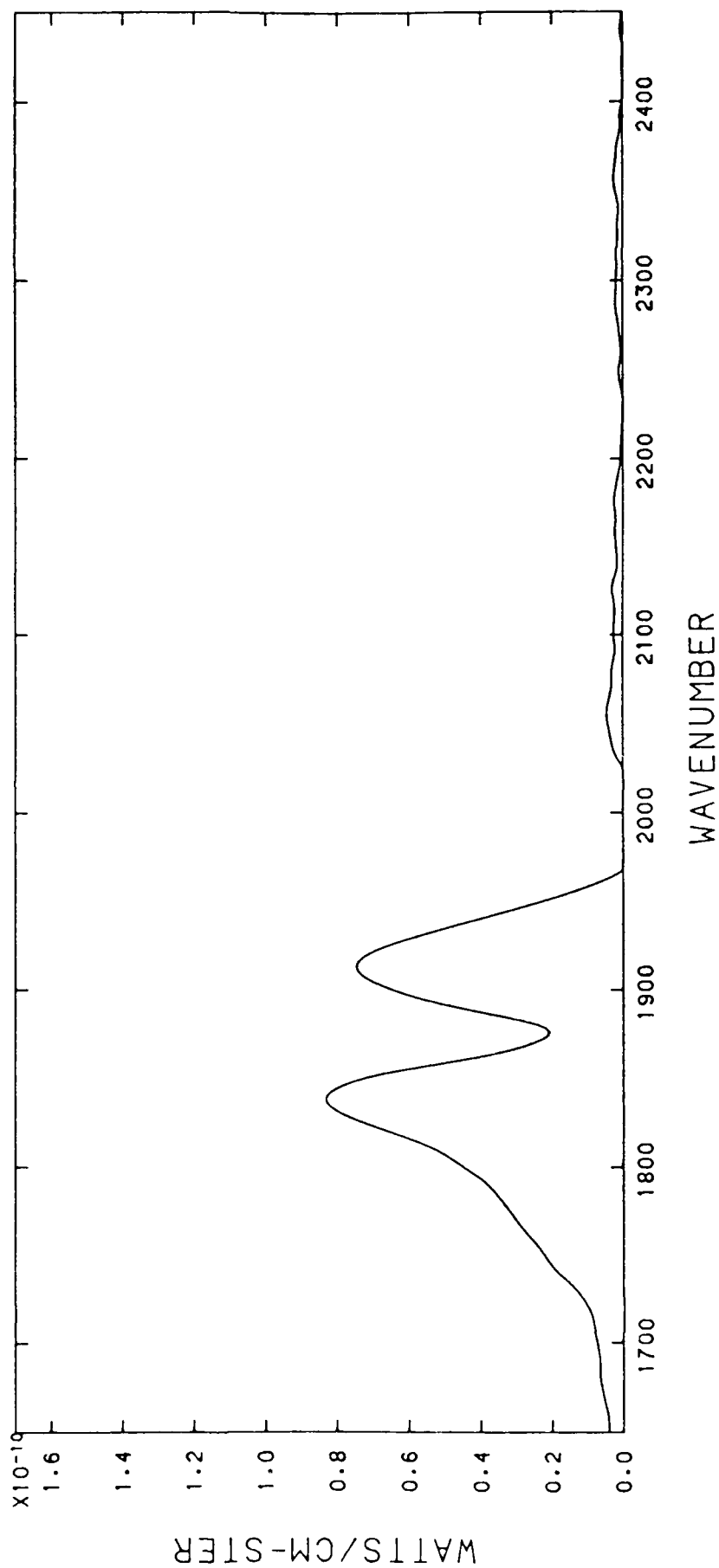
30-NOV-83 09:34



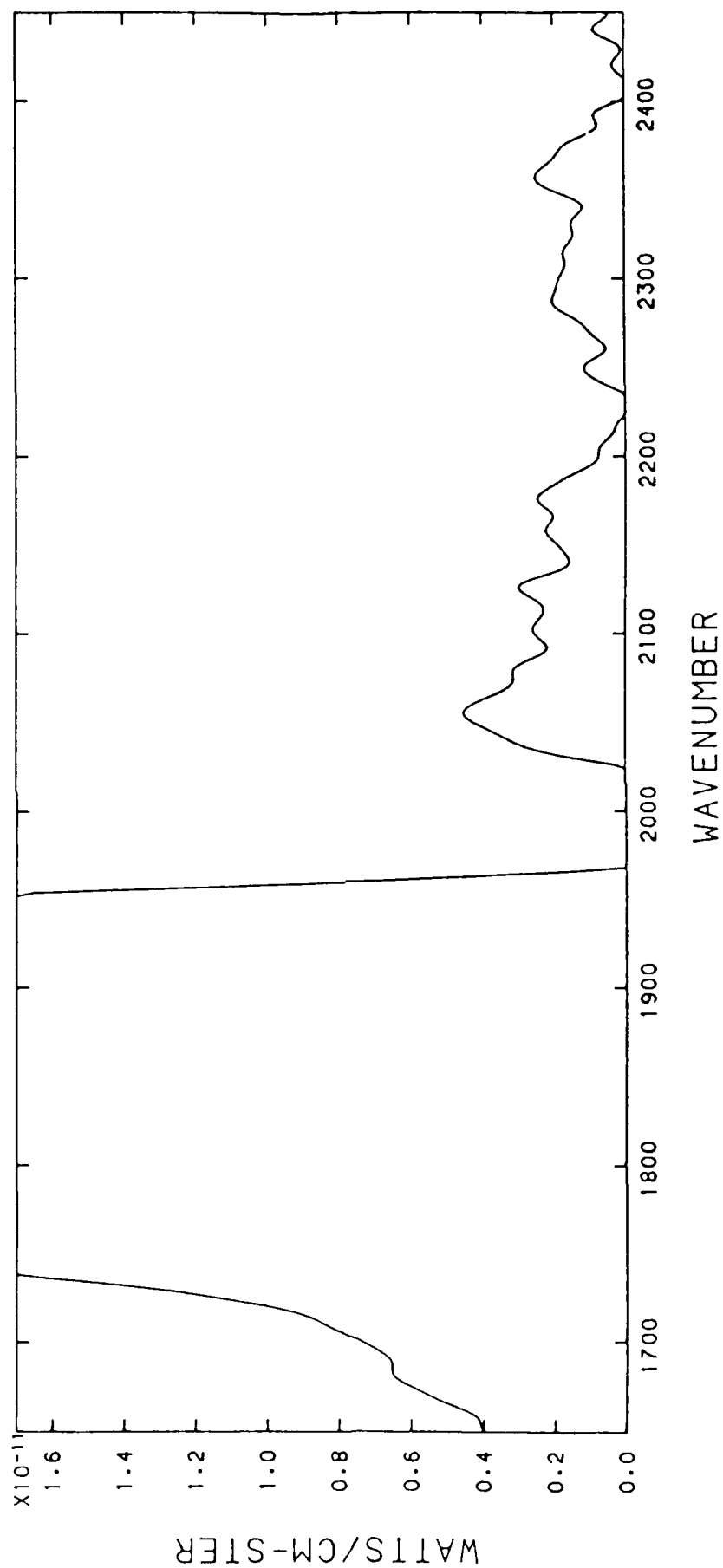
FILE 110, TIME 9:10:42.322, ALT 114.8-114.6 KM



FILE 110, TIME 9:10:42.322, ALT 114.8-114.6 KM

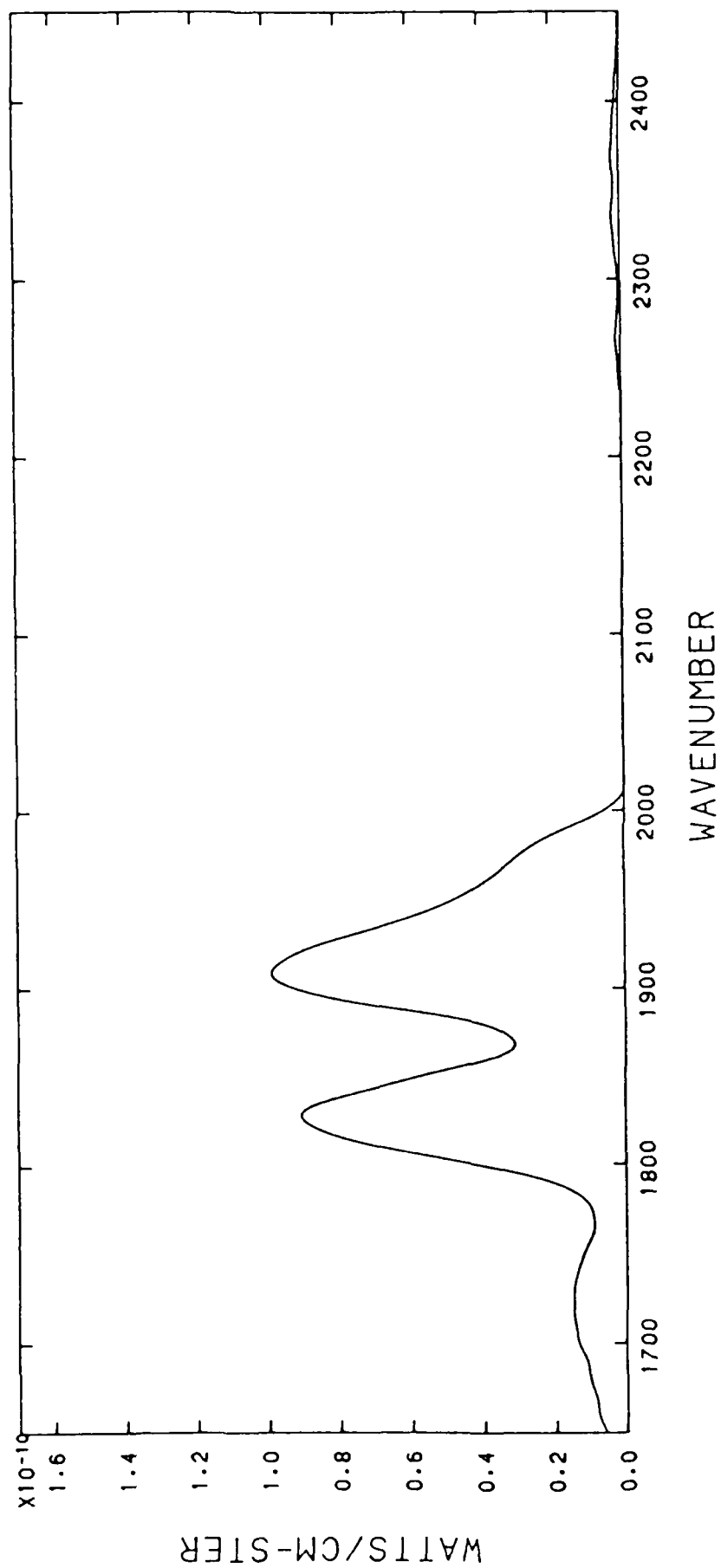


FILE 111, TIME 9:10:42.822, ALT 114.5-114.2 KM

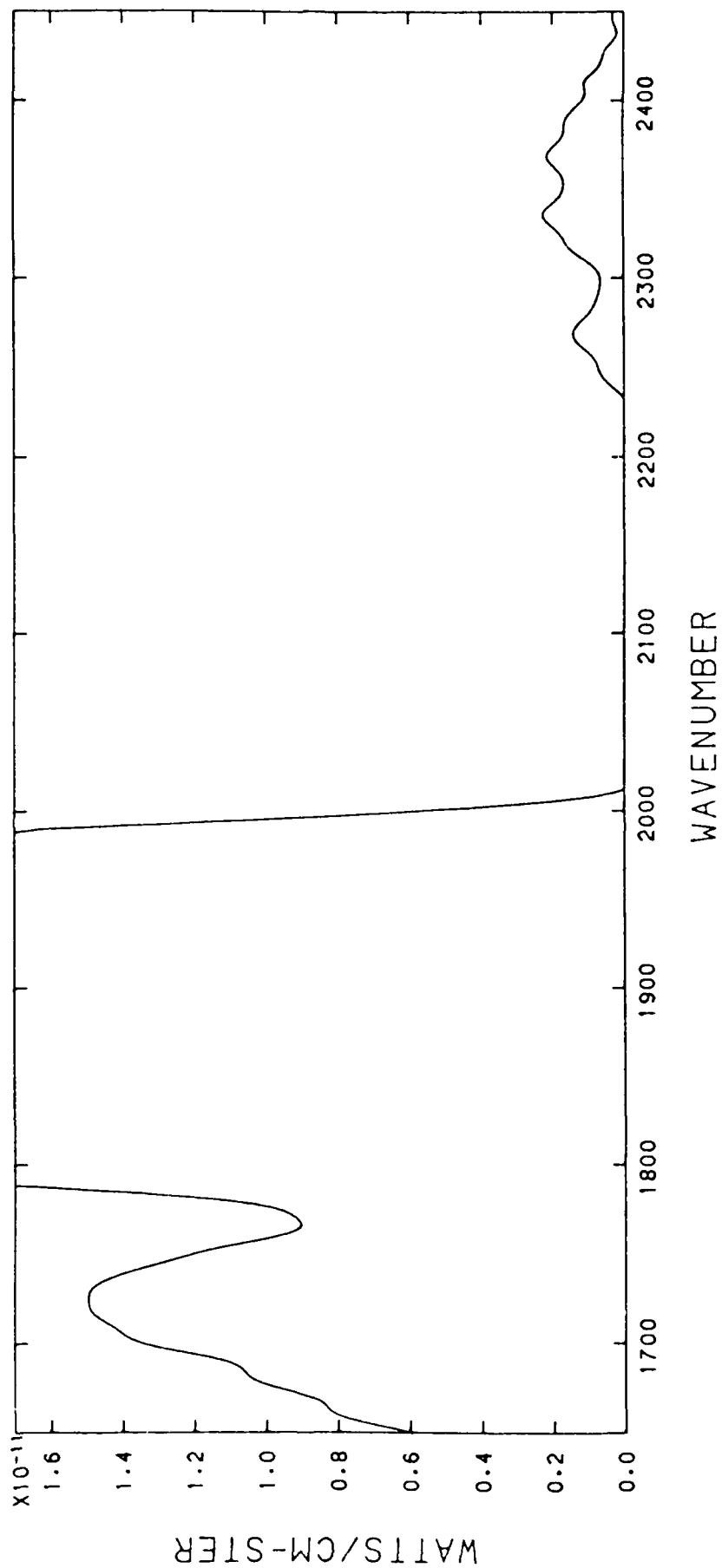


FILE 111, TIME 9:10:42.822, ALT 114.5-114.2 KM





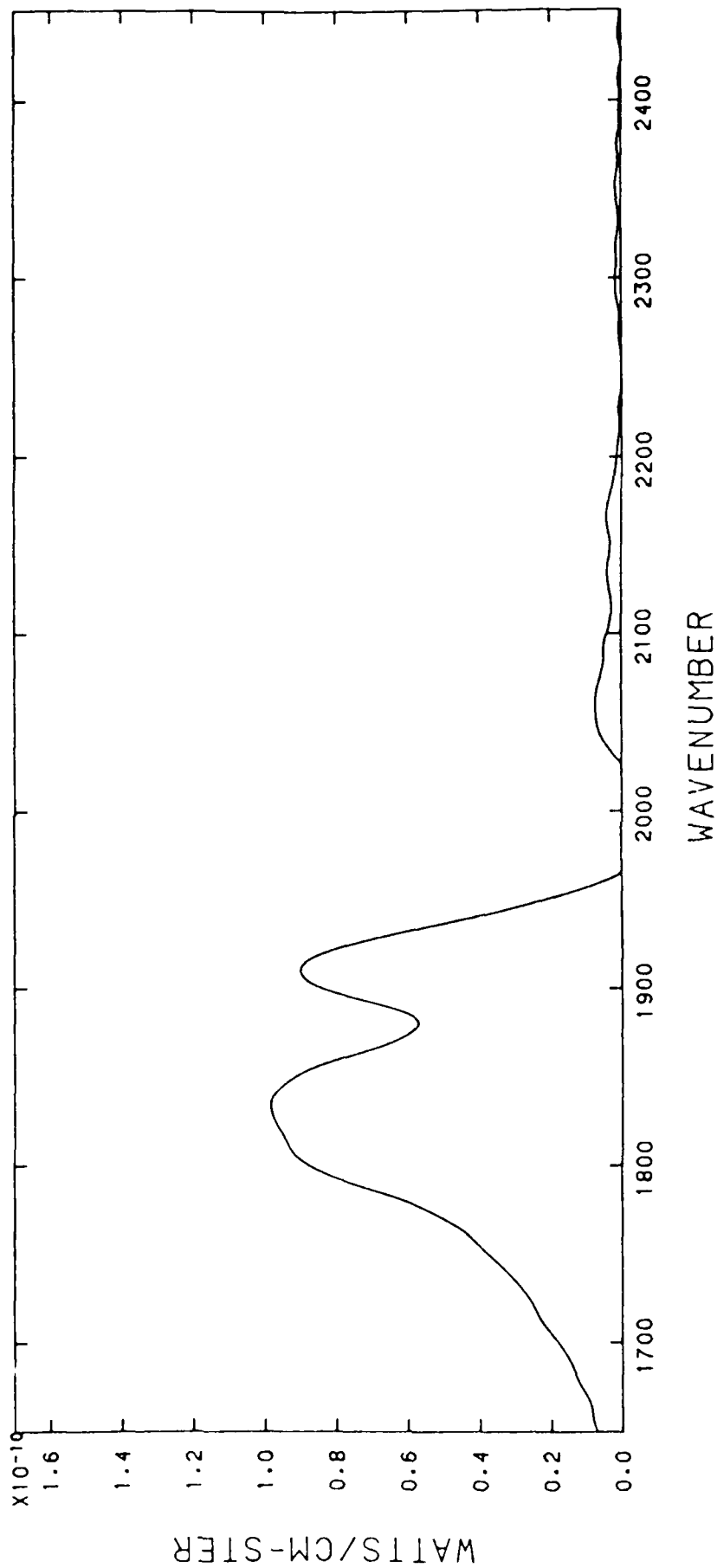
FILE 112, TIME 9:10:45.602, ALT 112.5-112.3 KM

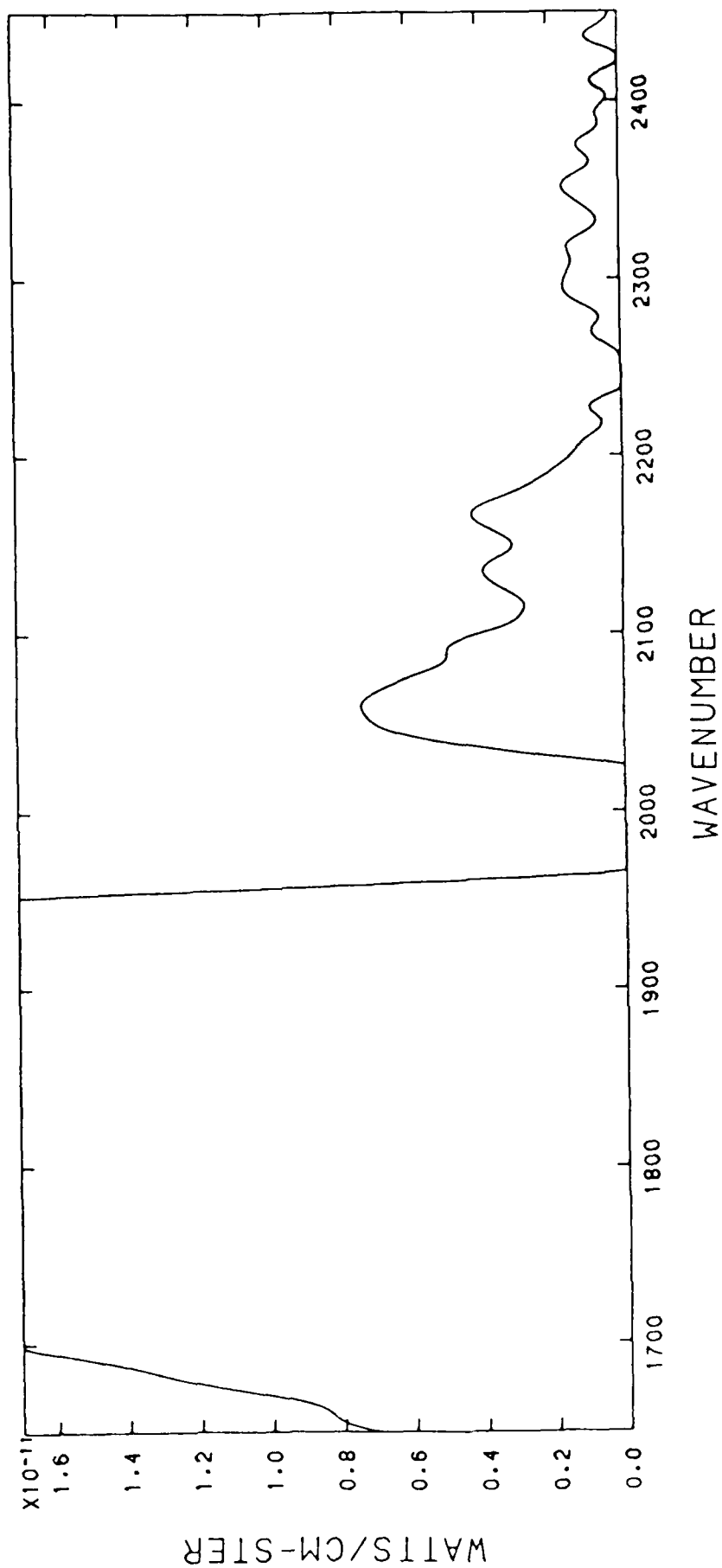


FILE 112, TIME 9:10:45.602, ALT 112.5-112.3 KM

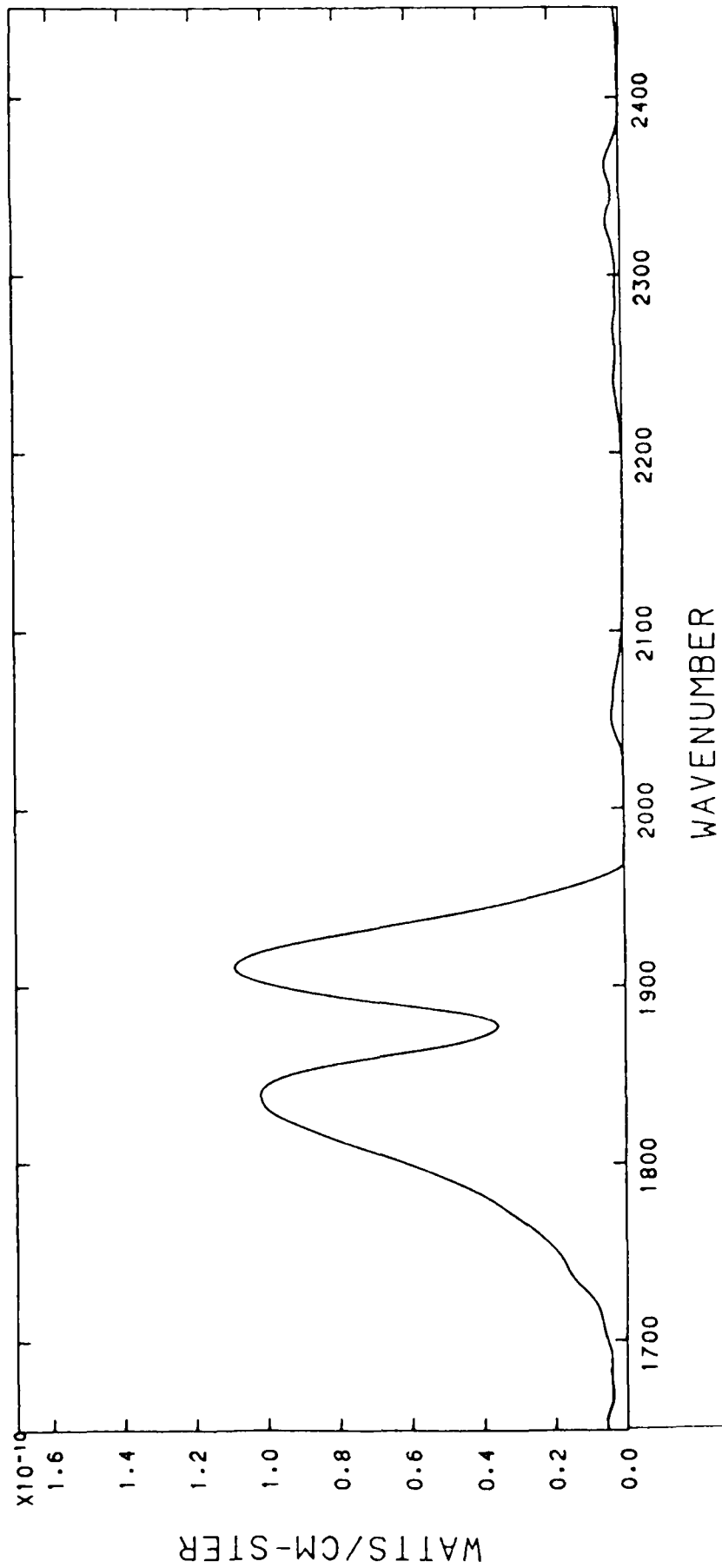
FILE 113, TIME 9:10:46. 96, ALT 112.2-111.9 KM

30-NOV-83 09:34

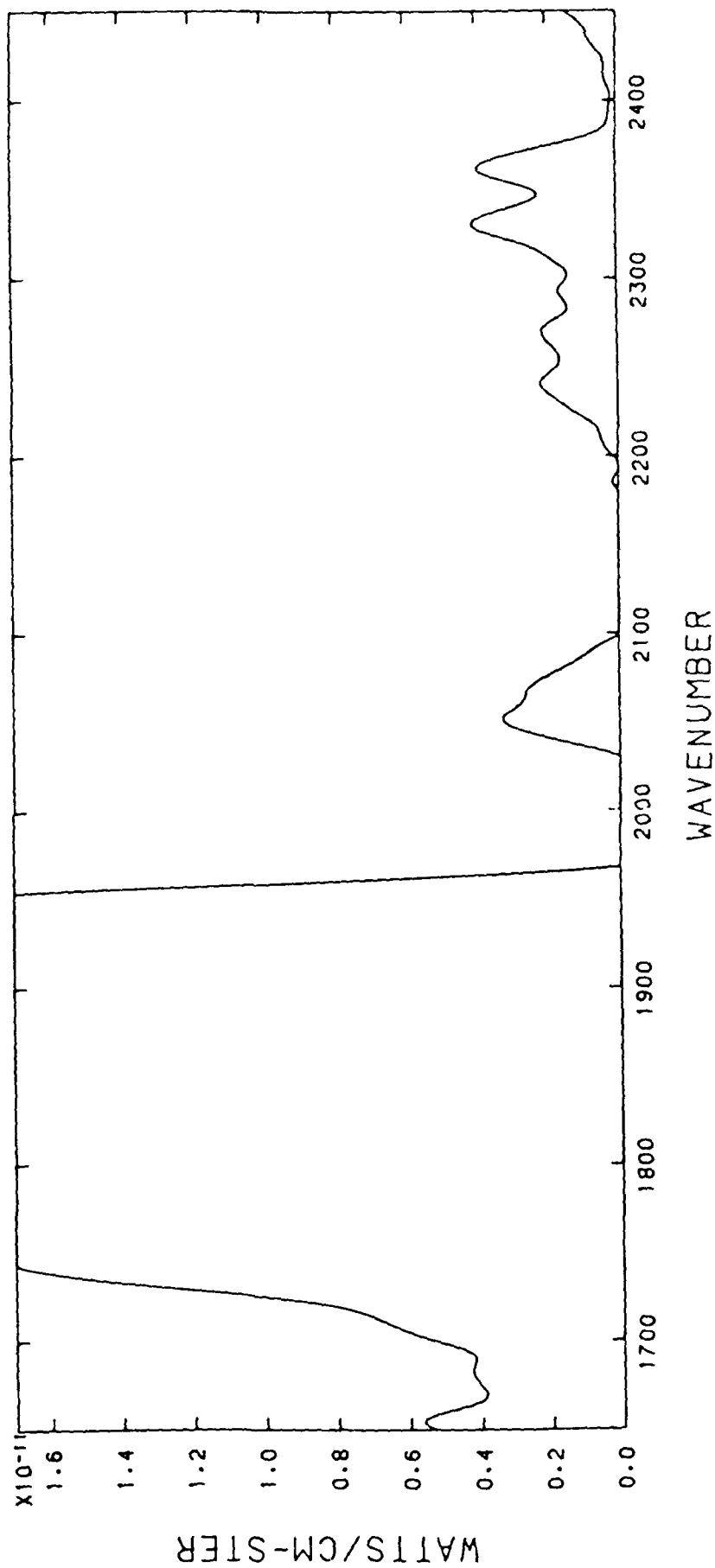




FILE 113, TIME 9:10:46. 96, ALT 112.2-111.9 KM

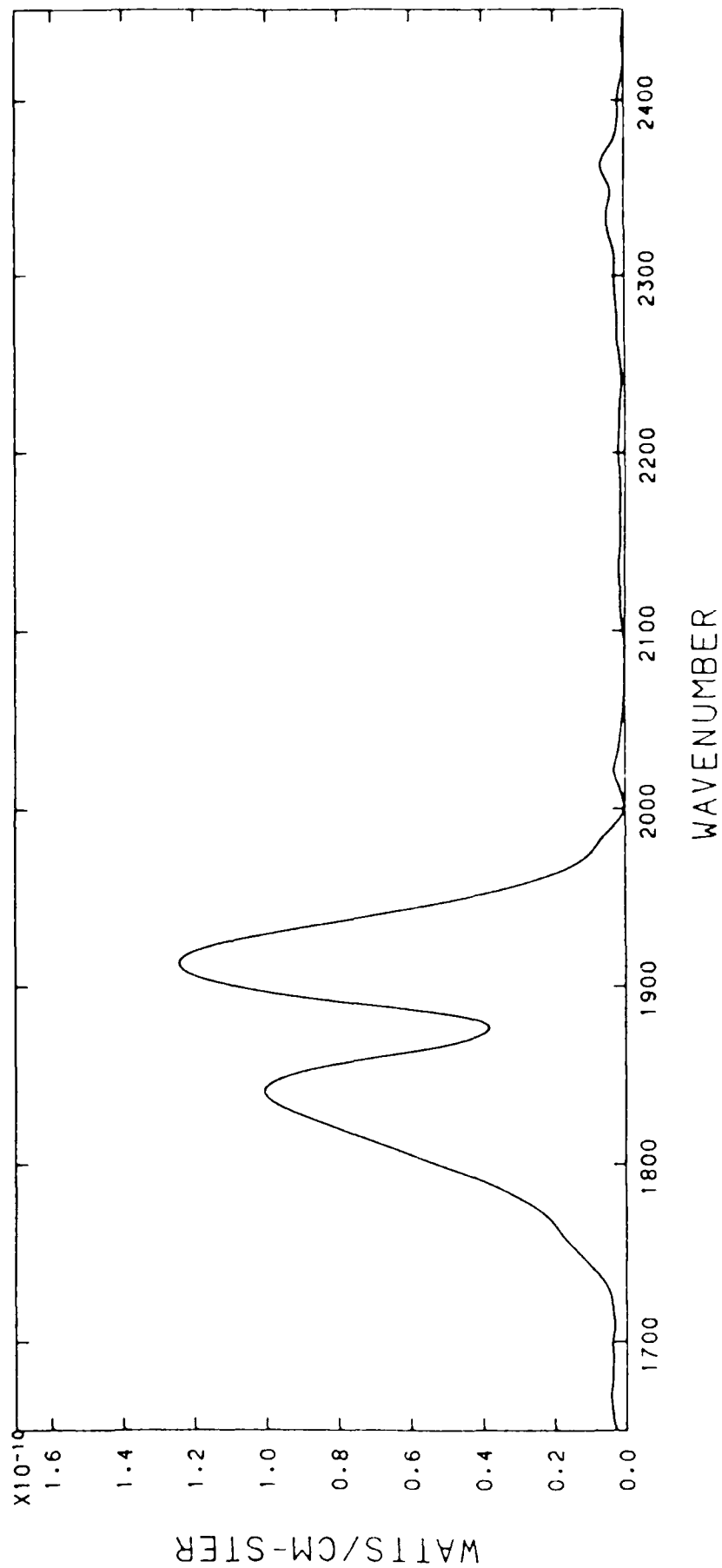


FILE 114, TIME 9:10:48.862, ALT 110.2-109.9 KM

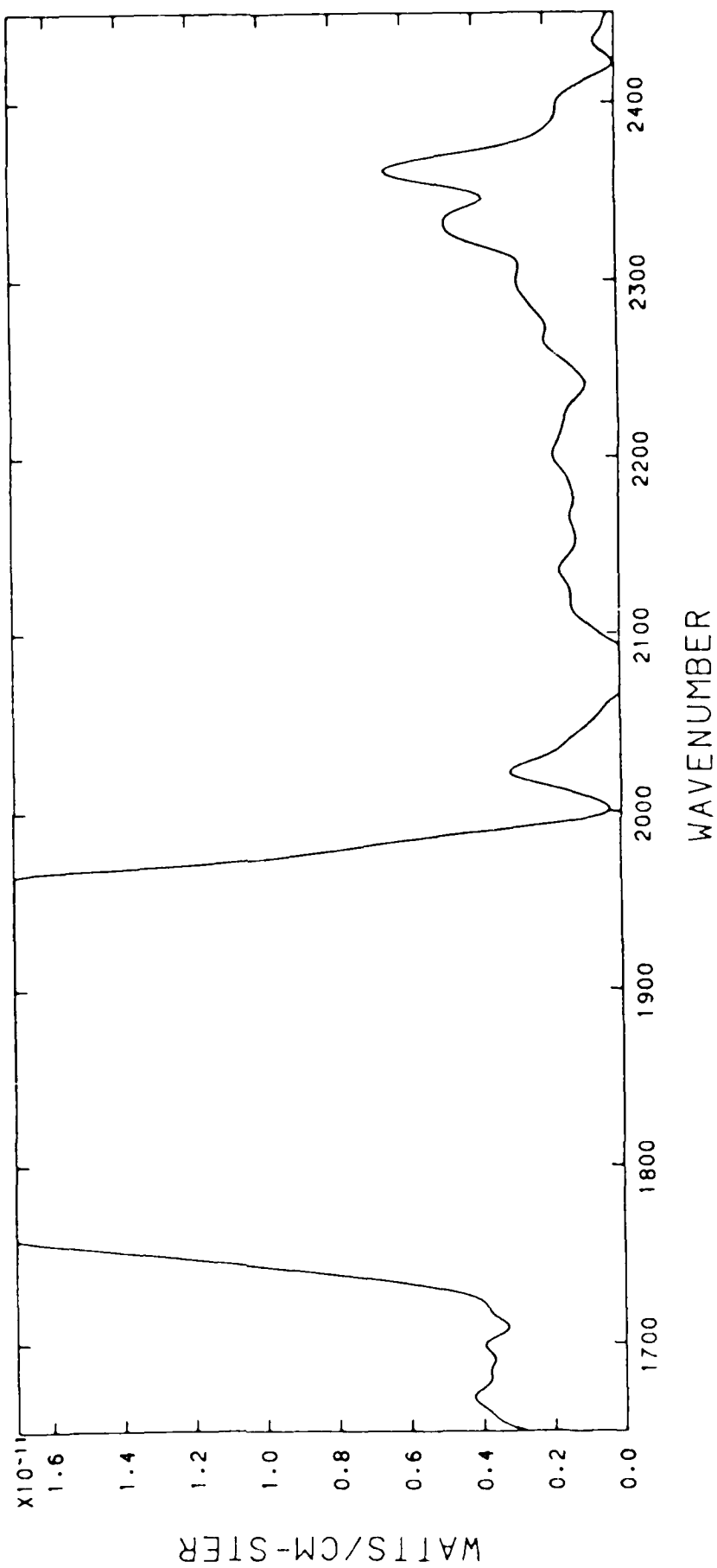


FILE 114, TIME 9:10:48.862, ALT 110.2-109.9 KM

30-NOV-83 09:35

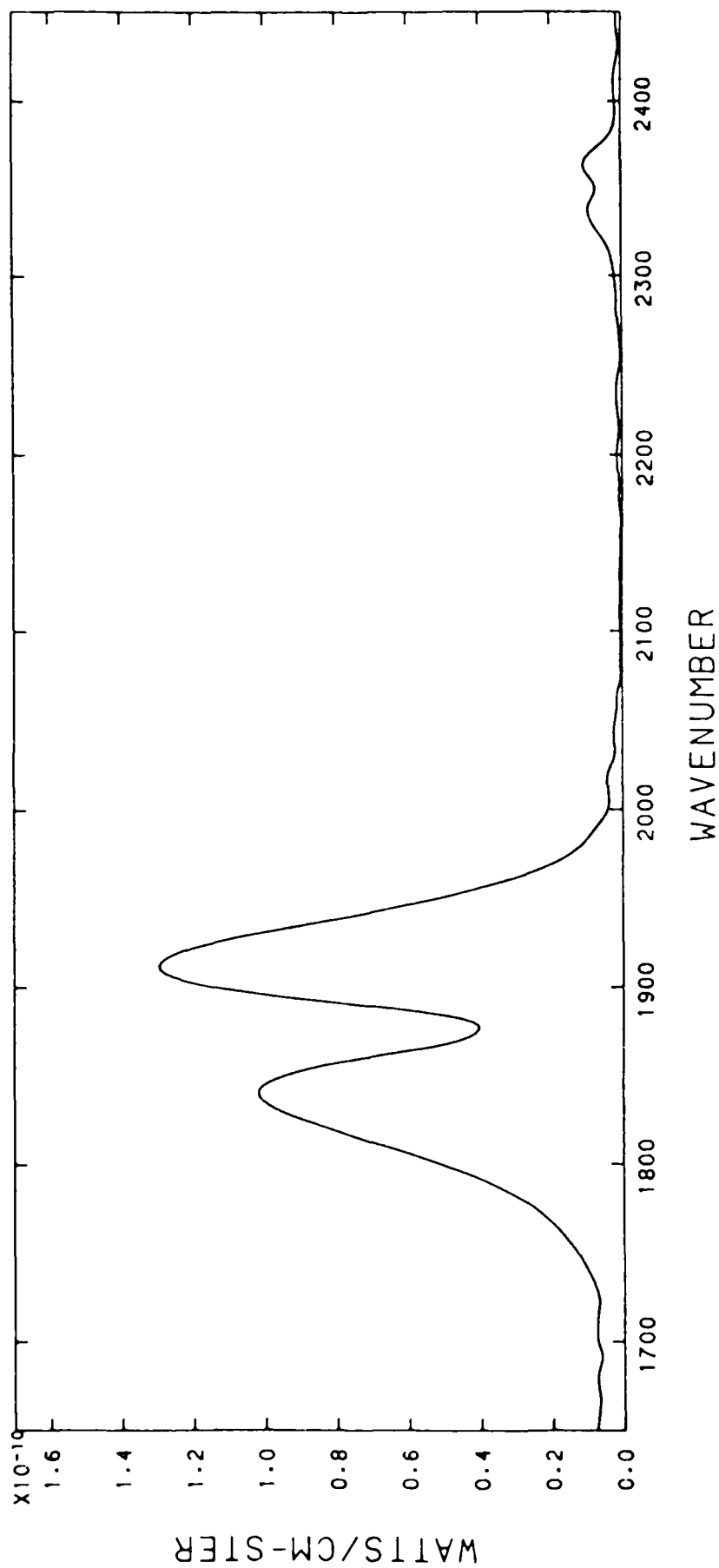


FILE 115, TIME 9:10:49.360, ALT 109.8-109.6 KM

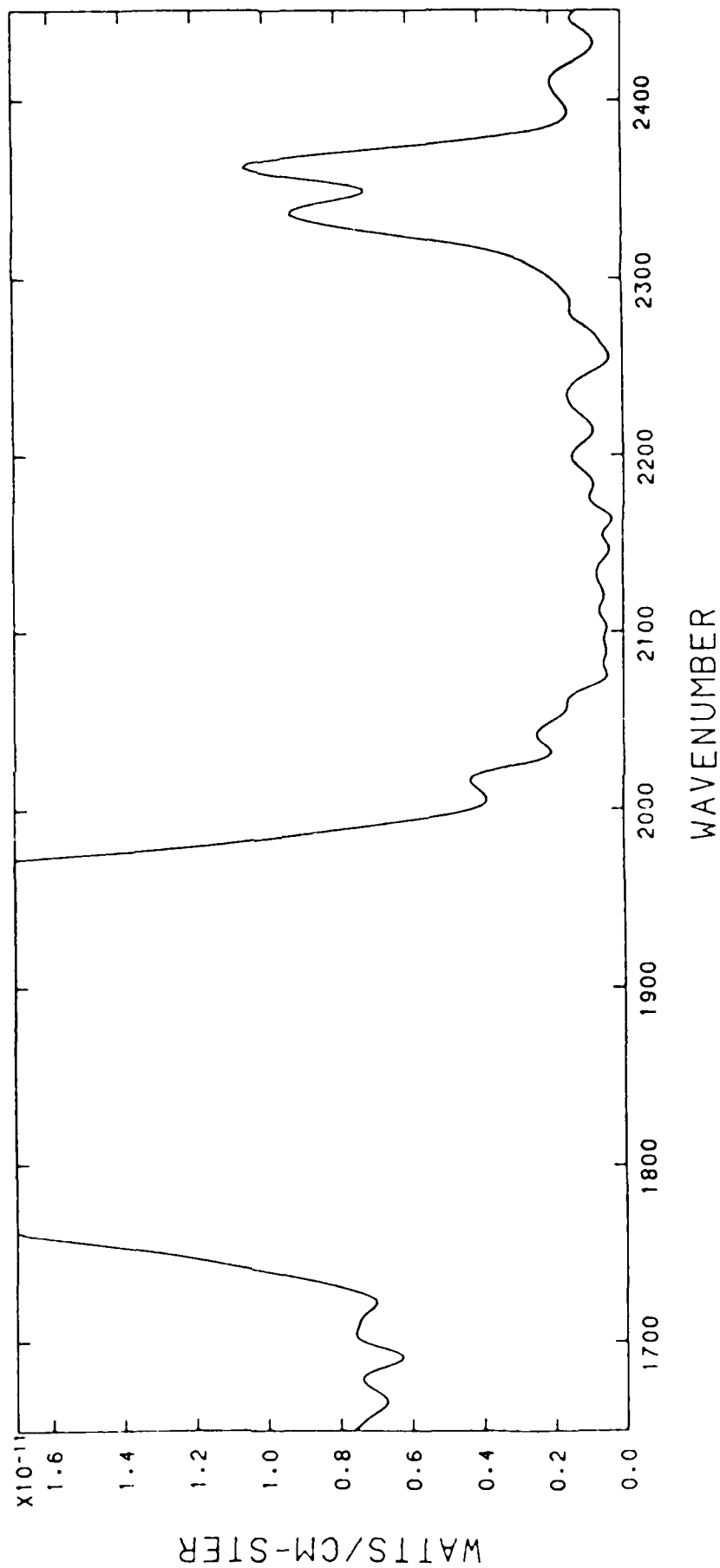


FILE 115, TIME 9:10:49.360, ALT 109.8-109.6 KM

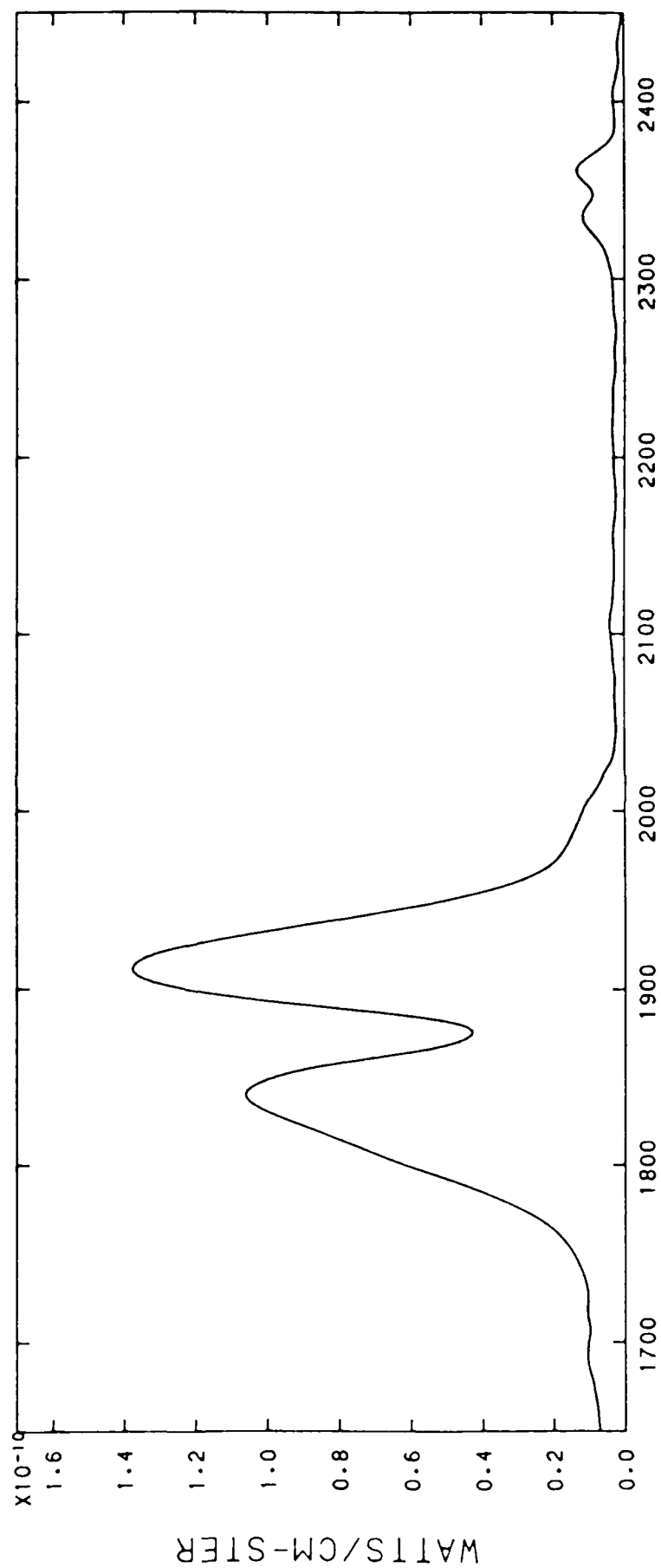




FILE 116, TIME 9:10:52.120, ALT 107.7-107.4 KM



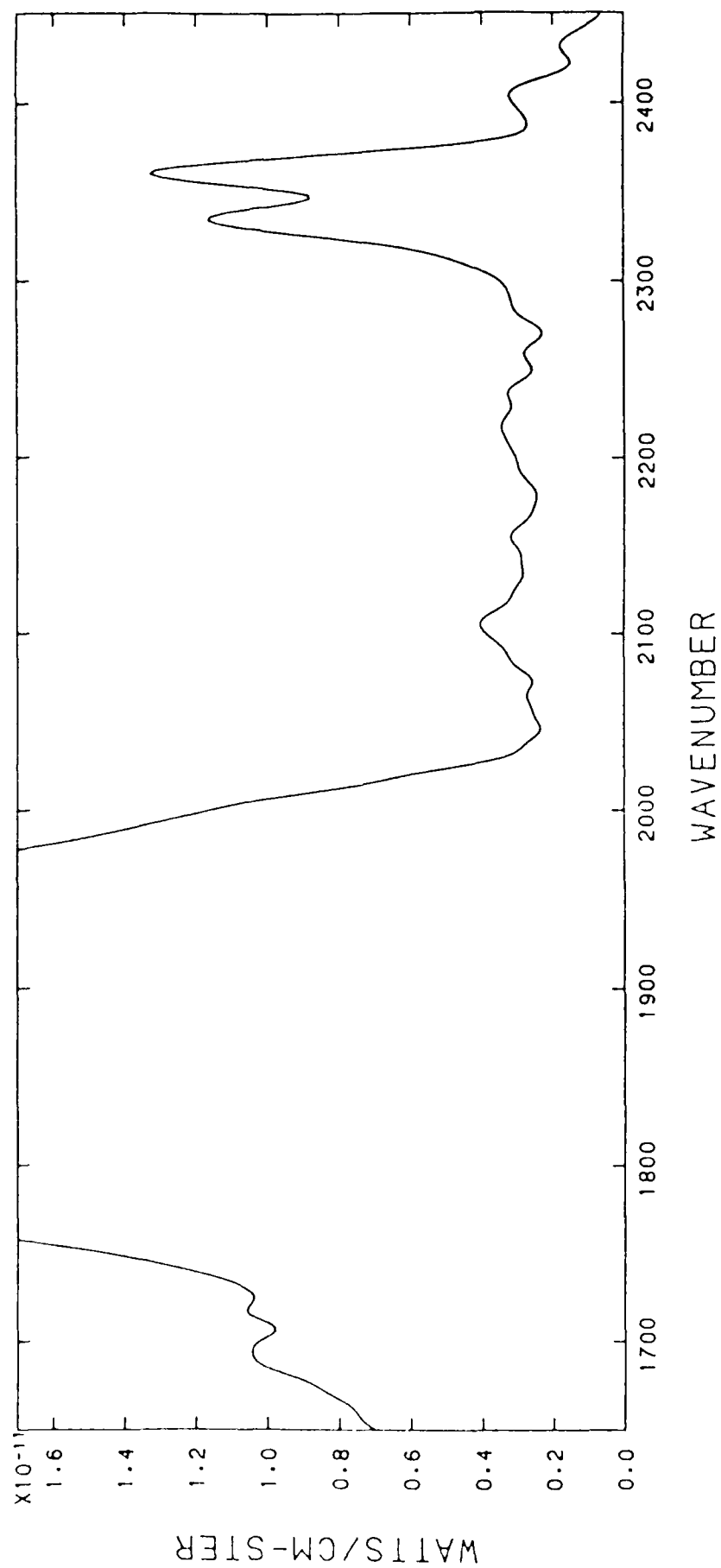
FILE 116, TIME 9:10:52.120, ALT 107.7-107.4 KM



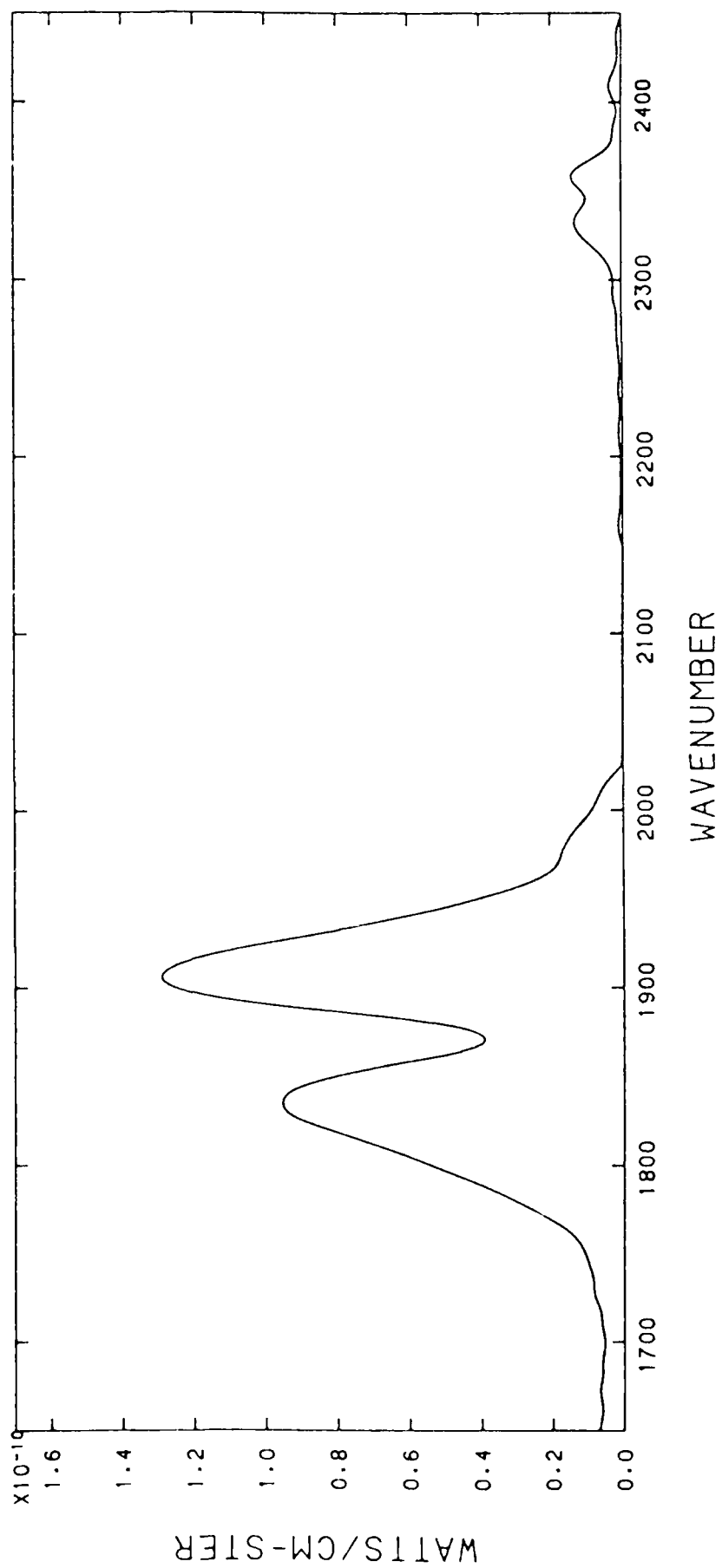
WAVENUMBER

FILE 117, TIME 9:10:52.616, ALT 107.3-107.1 KM

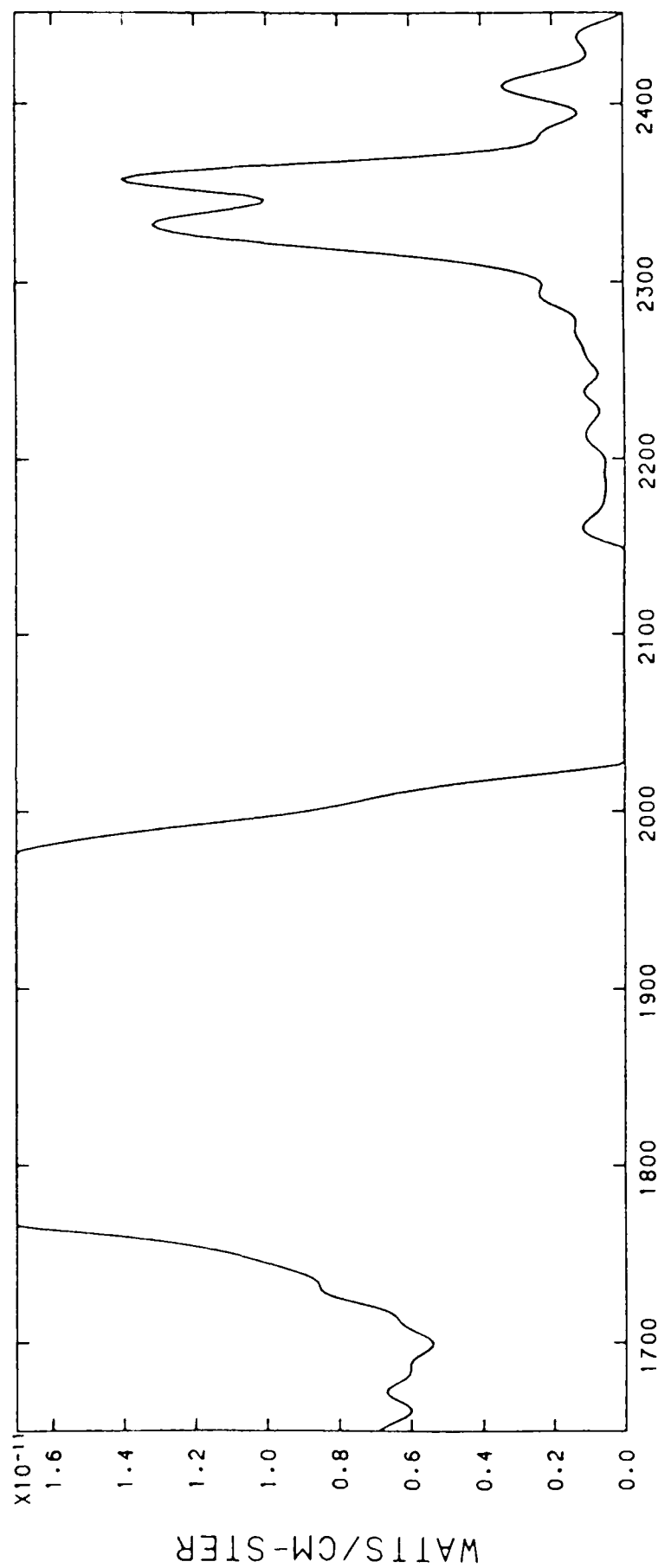
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FILE 117, TIME 9:10:52.616, ALT 107.3-107.1 KM

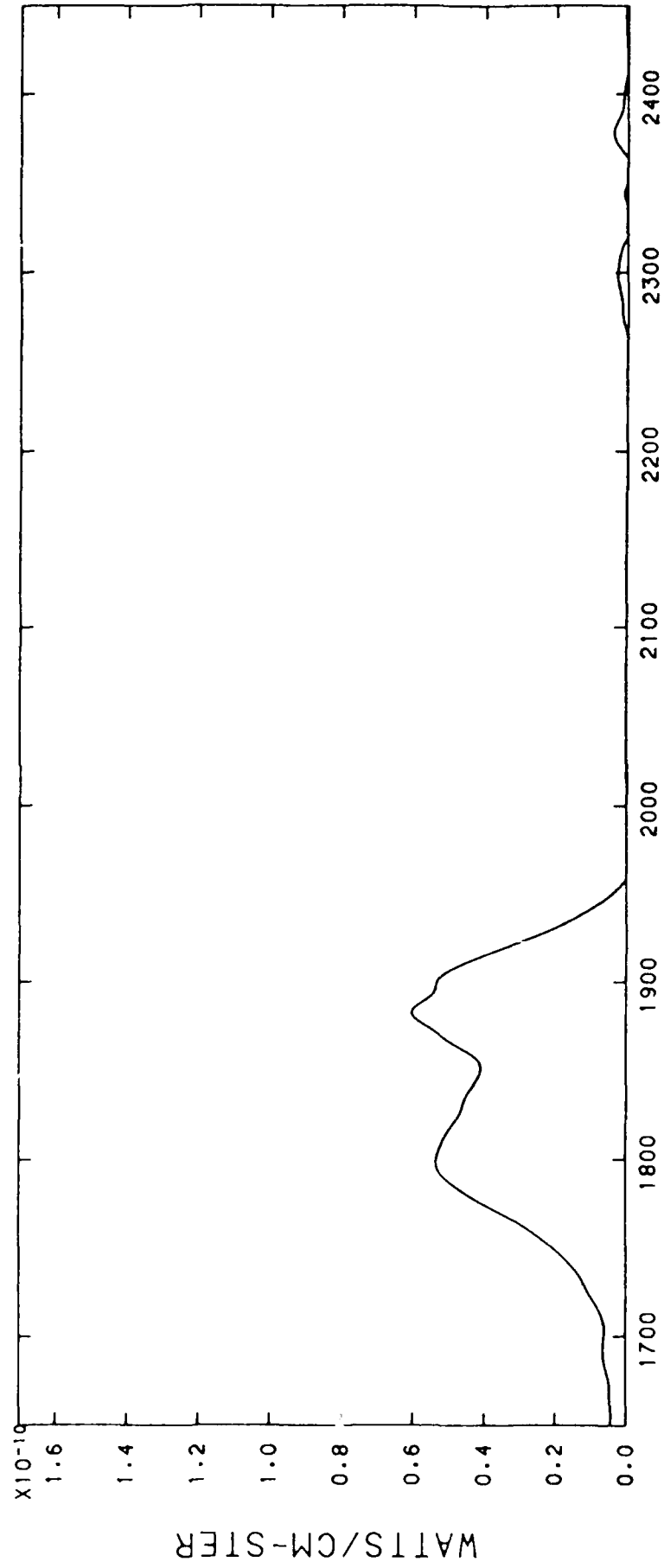


FILE 118, TIME 9:10:55.372, ALT 105.2-104.9 KM



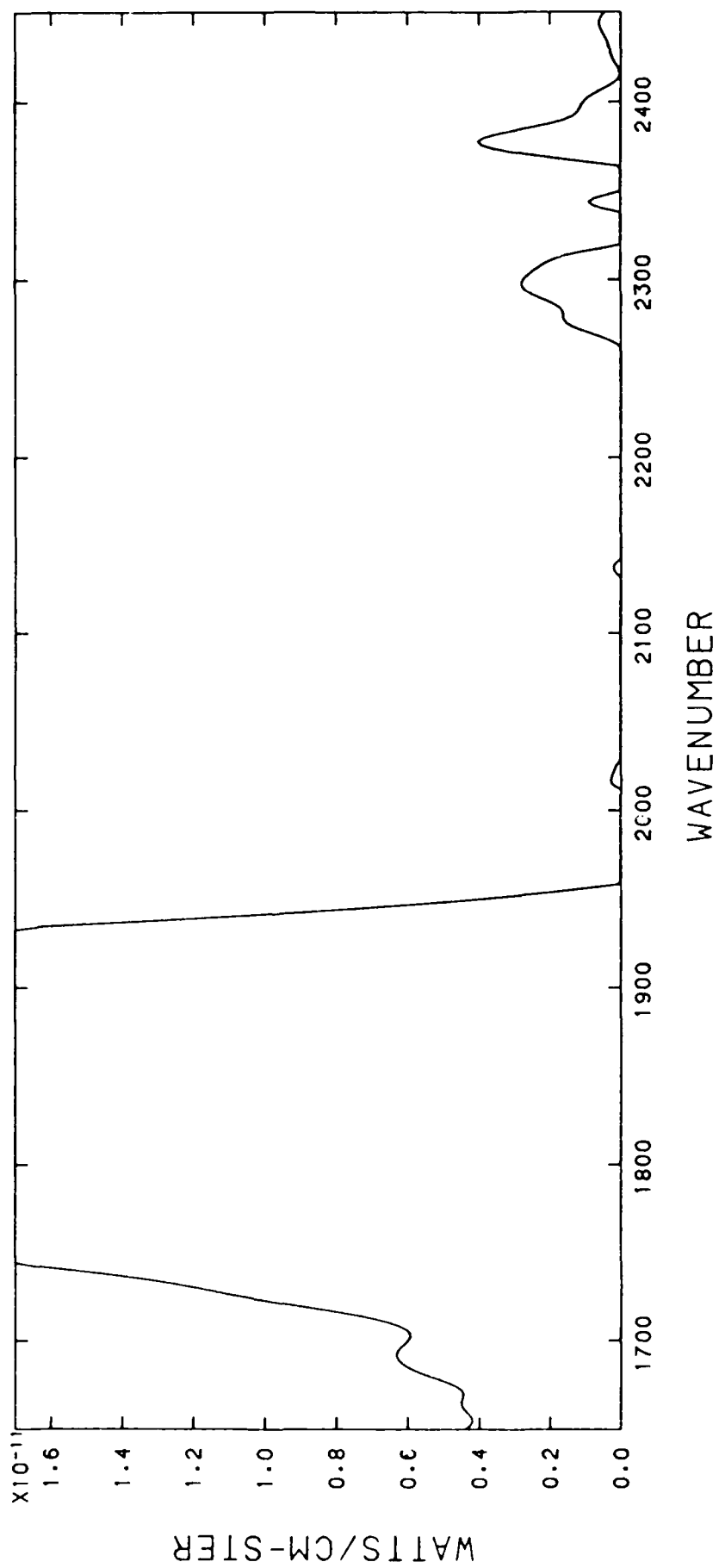
WAVENUMBER

FILE 118, TIME 9:10:55.372, ALT 105.2-104.9 KM



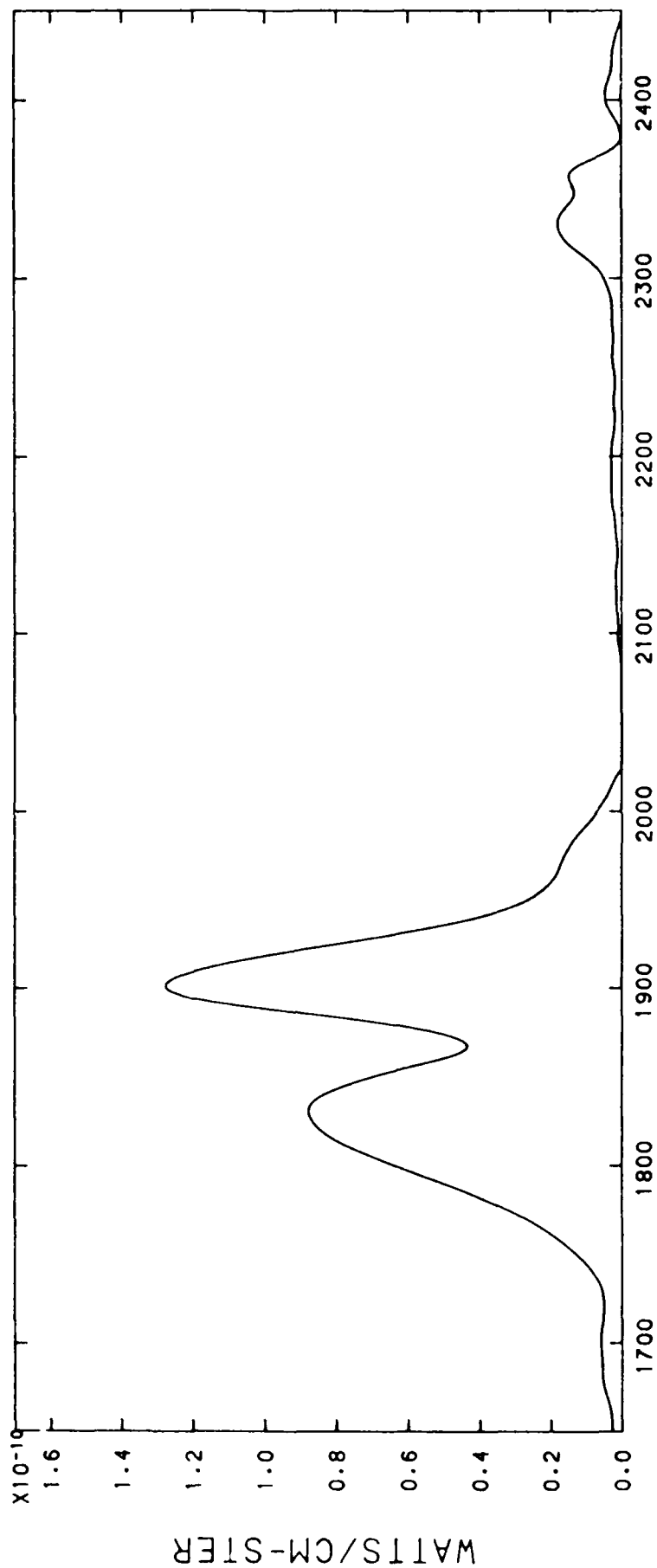
WAVENUMBER

FILE 119, TIME 9:10:55.868, ALT 104.8-104.5 KM



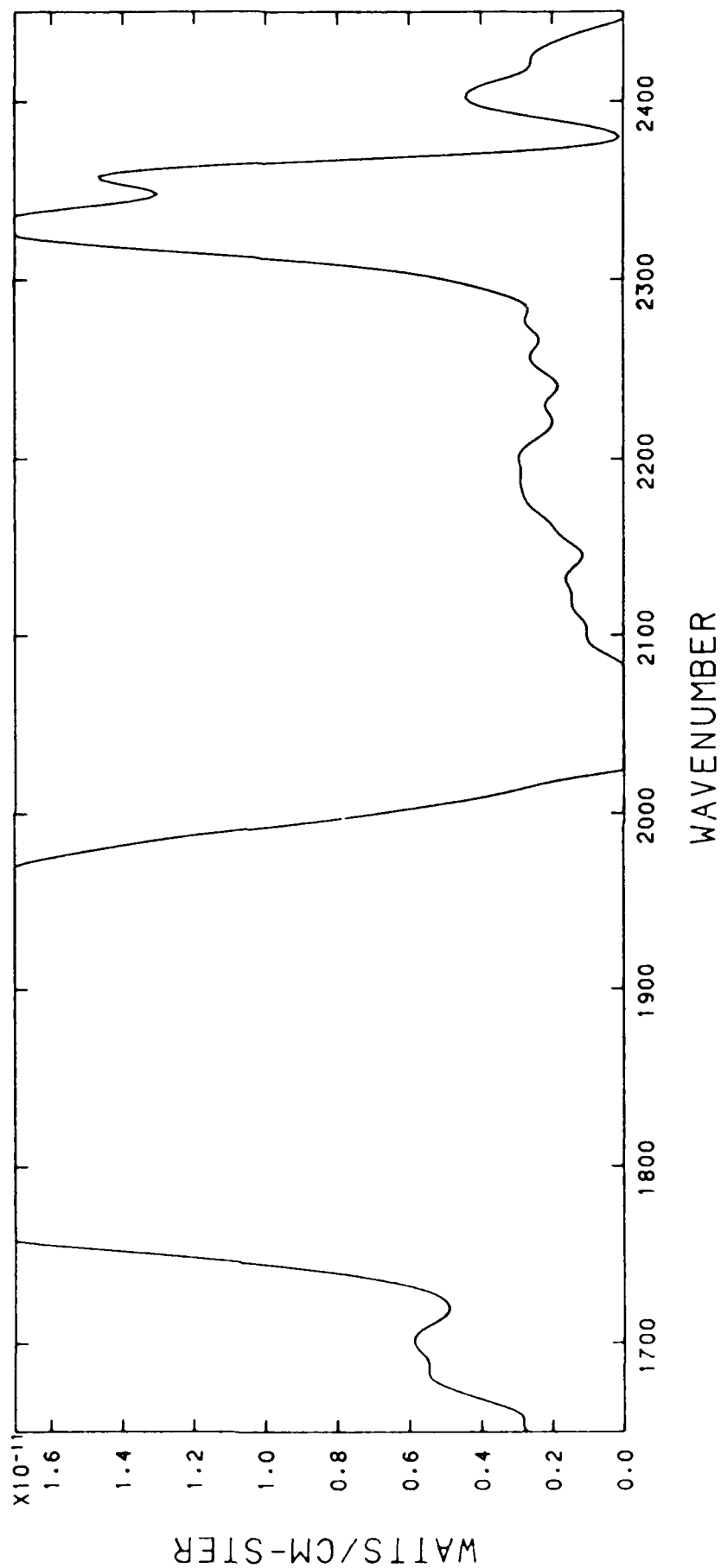
FILE 119, TIME 9:10:55.868, ALT 104.8-104.5 KM



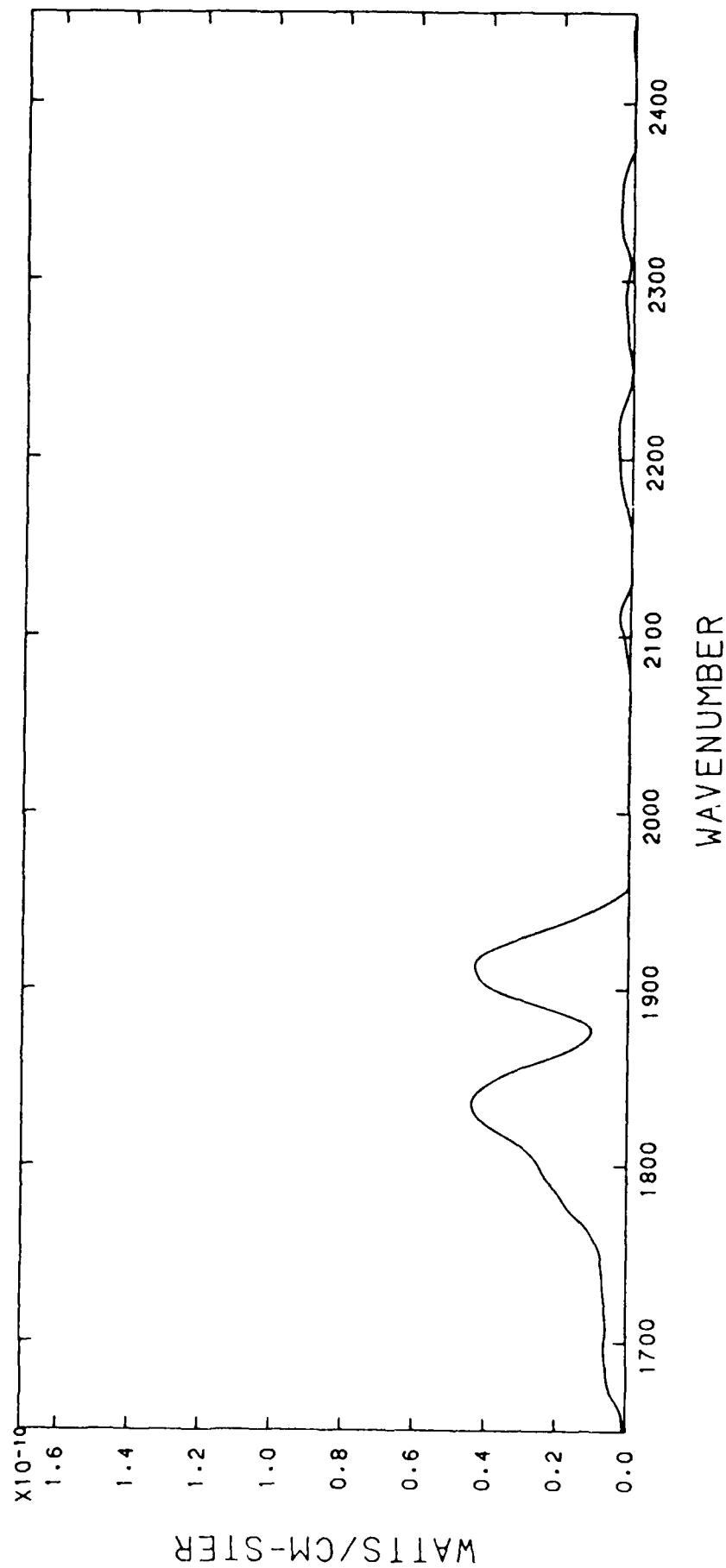


WAVENUMBER

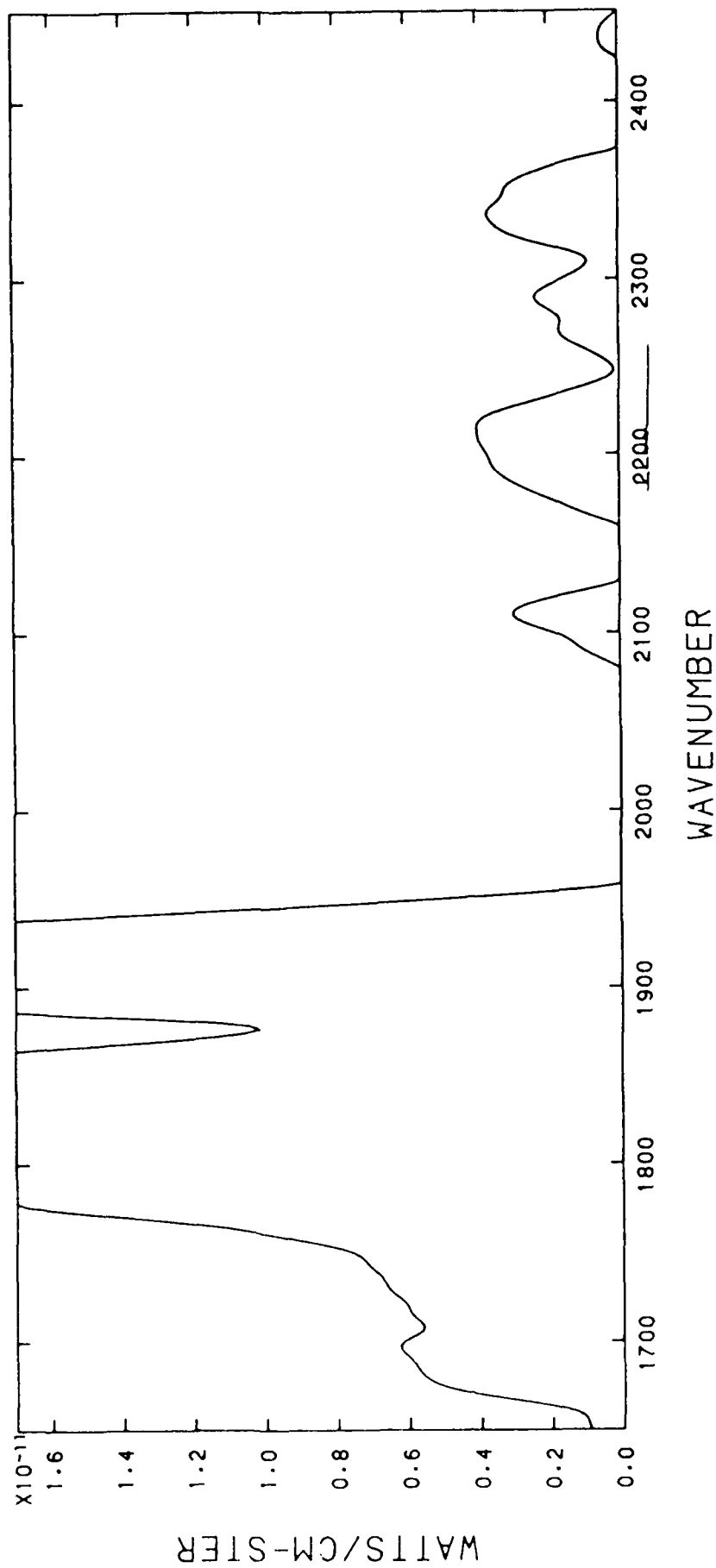
FILE 120, TIME 9:10:58.624, ALT 102.5-102.2 KM



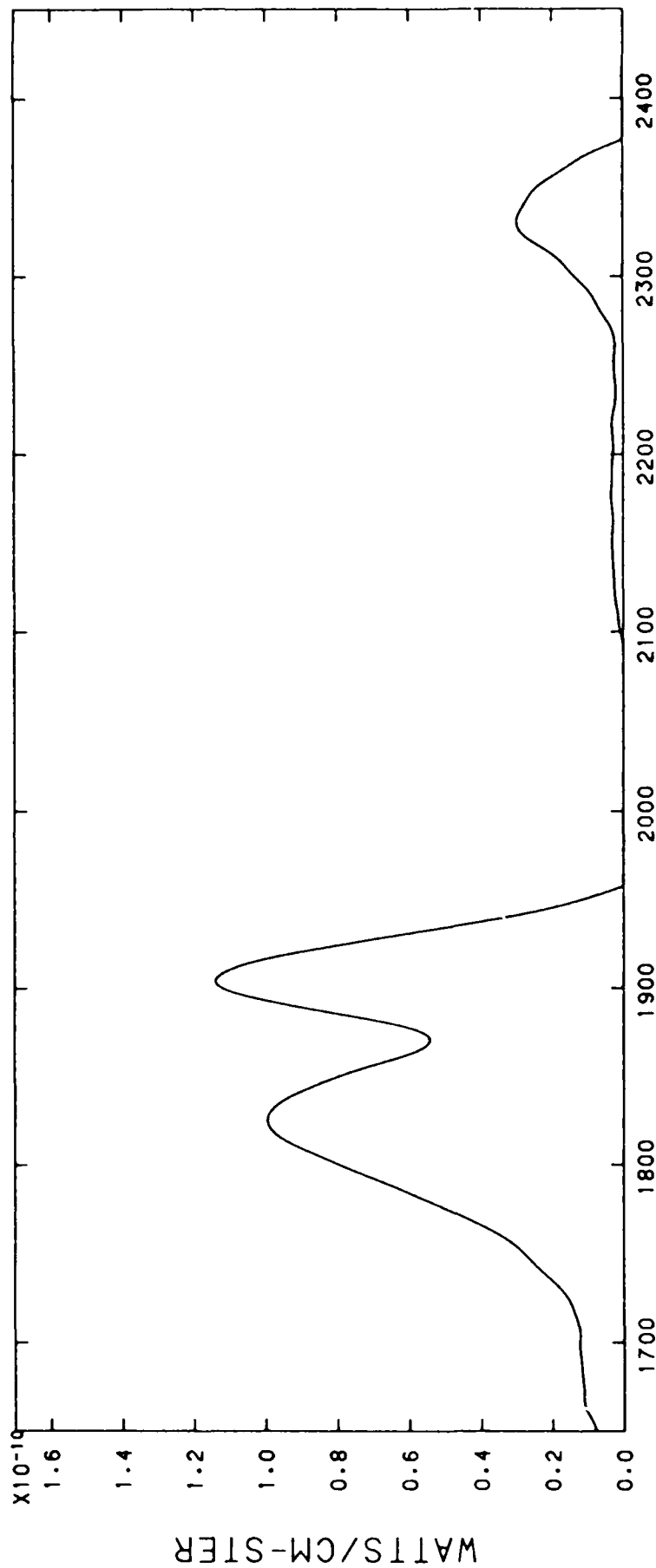
FILE 120, TIME 9:10:58.624, ALT 102.5-102.2 KM



FILE 121, TIME 9:10:59.118, ALT 102.1-101.8 KM

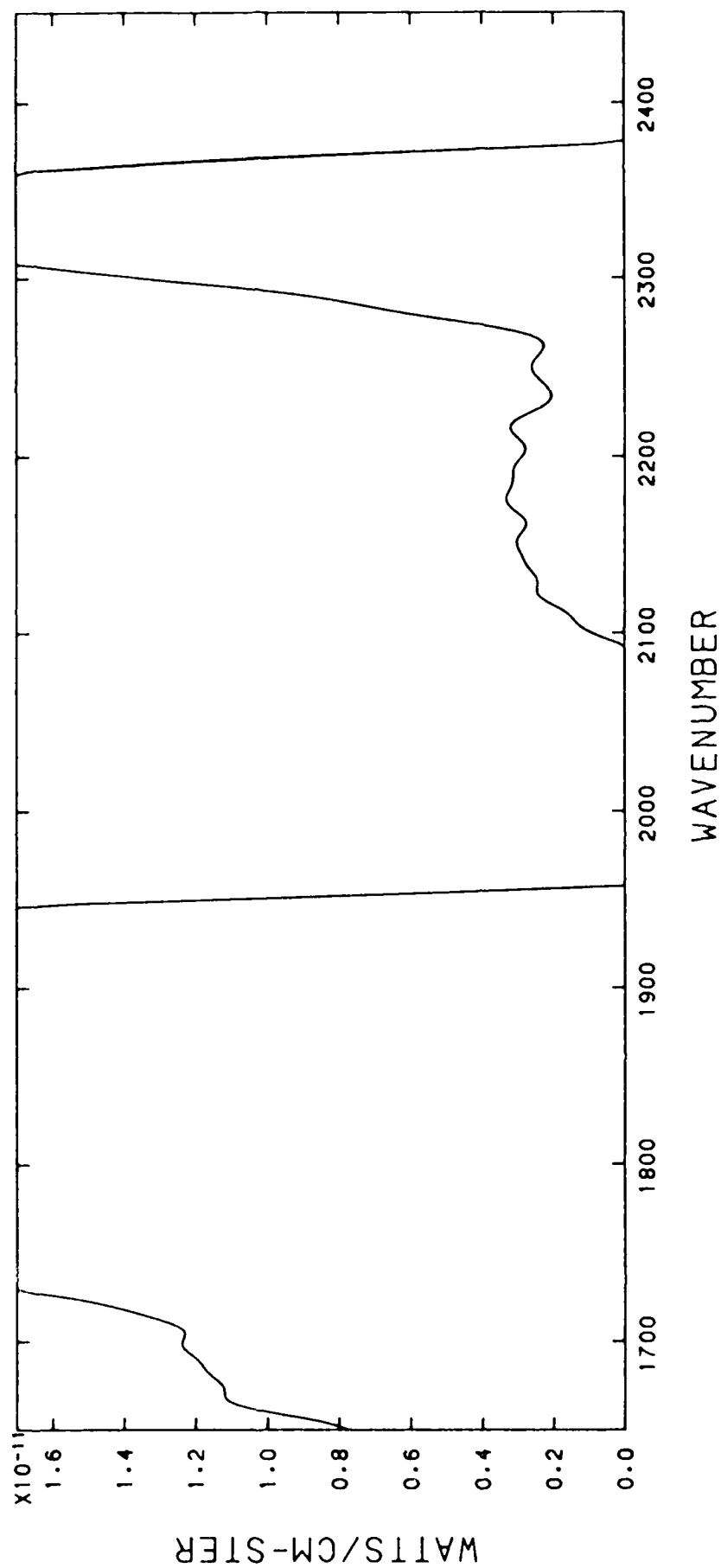


FILE 121, TIME 9:10:59.118, ALT 102.1-101.8 KM

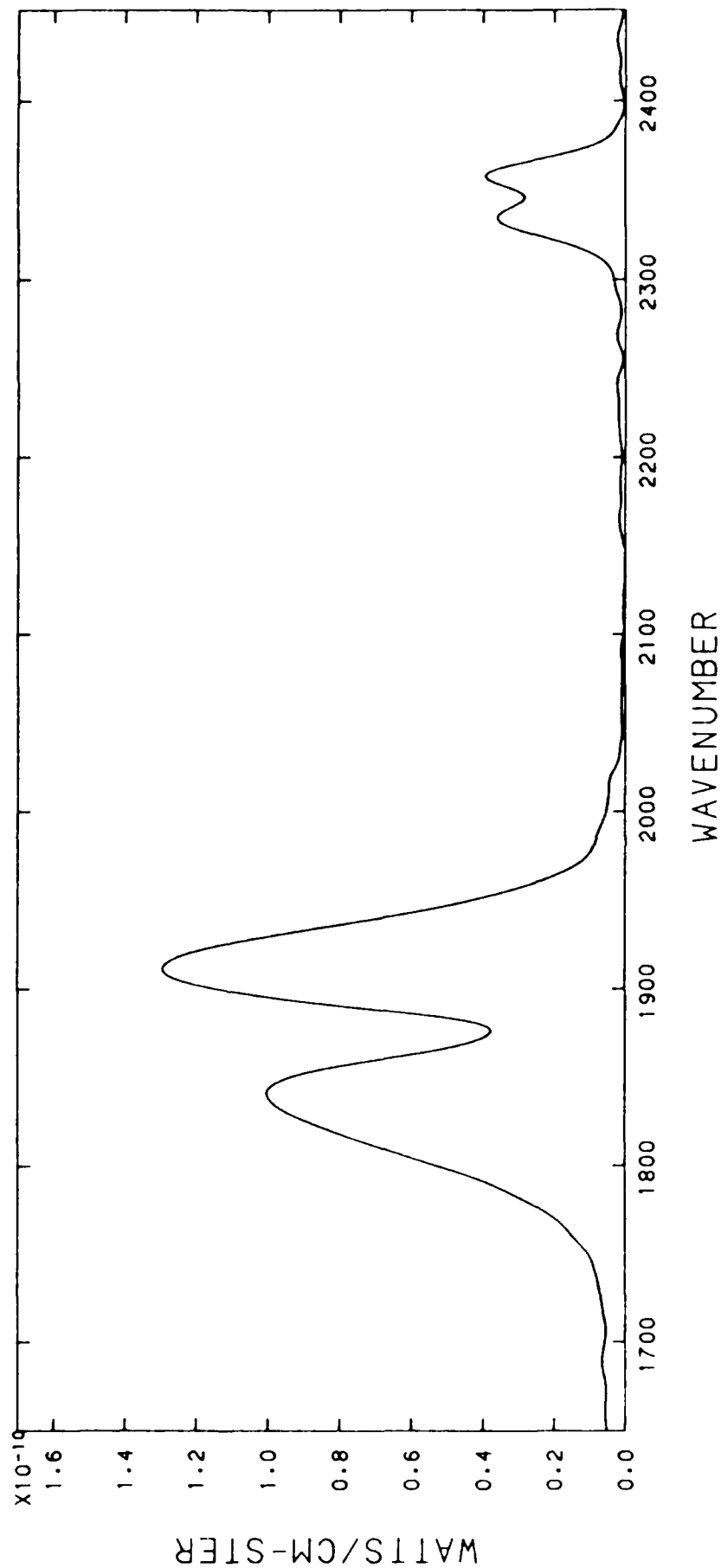


WAVENUMBER

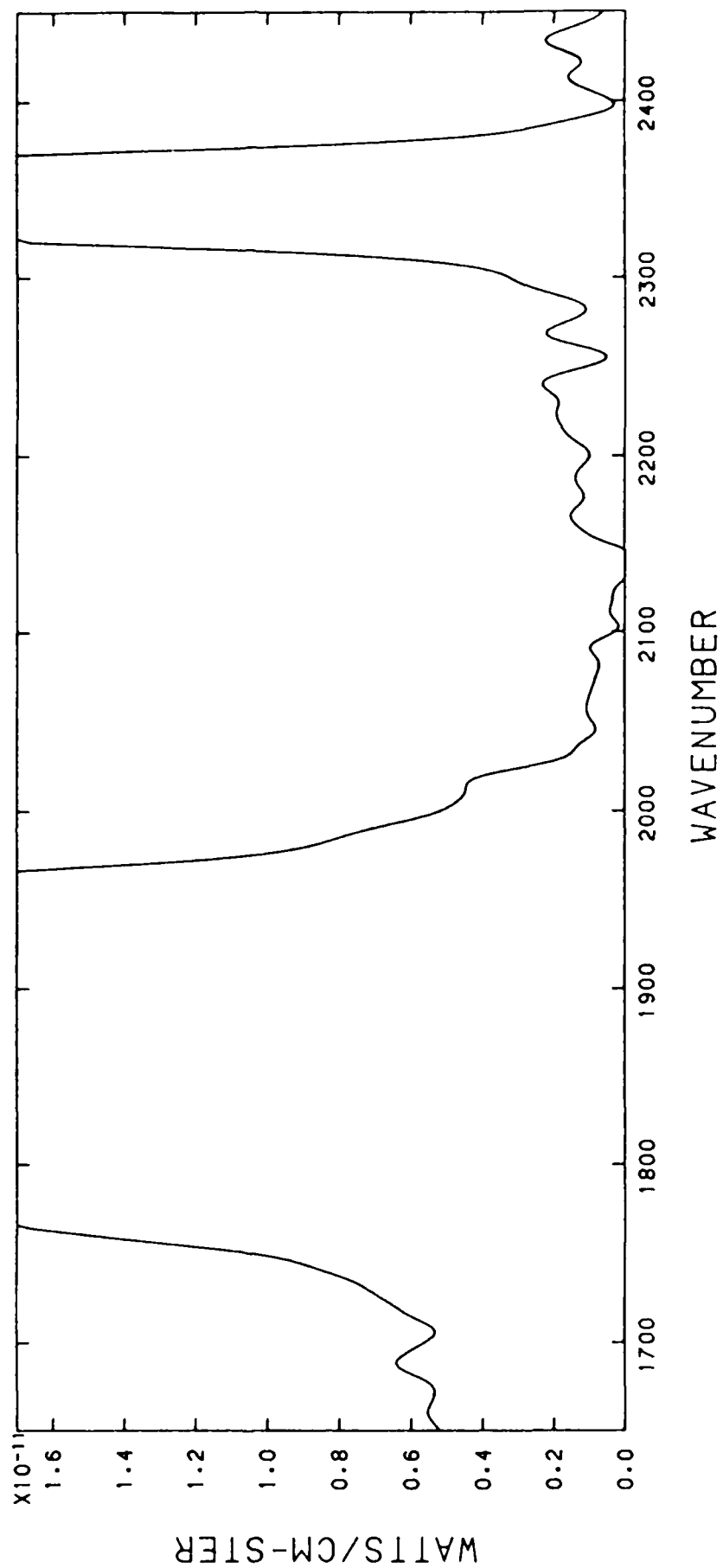
FILE 122, TIME 9:11: 1.874, ALT 99.7- 99.5 KM



FILE 122, TIME 9:11: 1.874, ALT 99.7- 99.5 KM

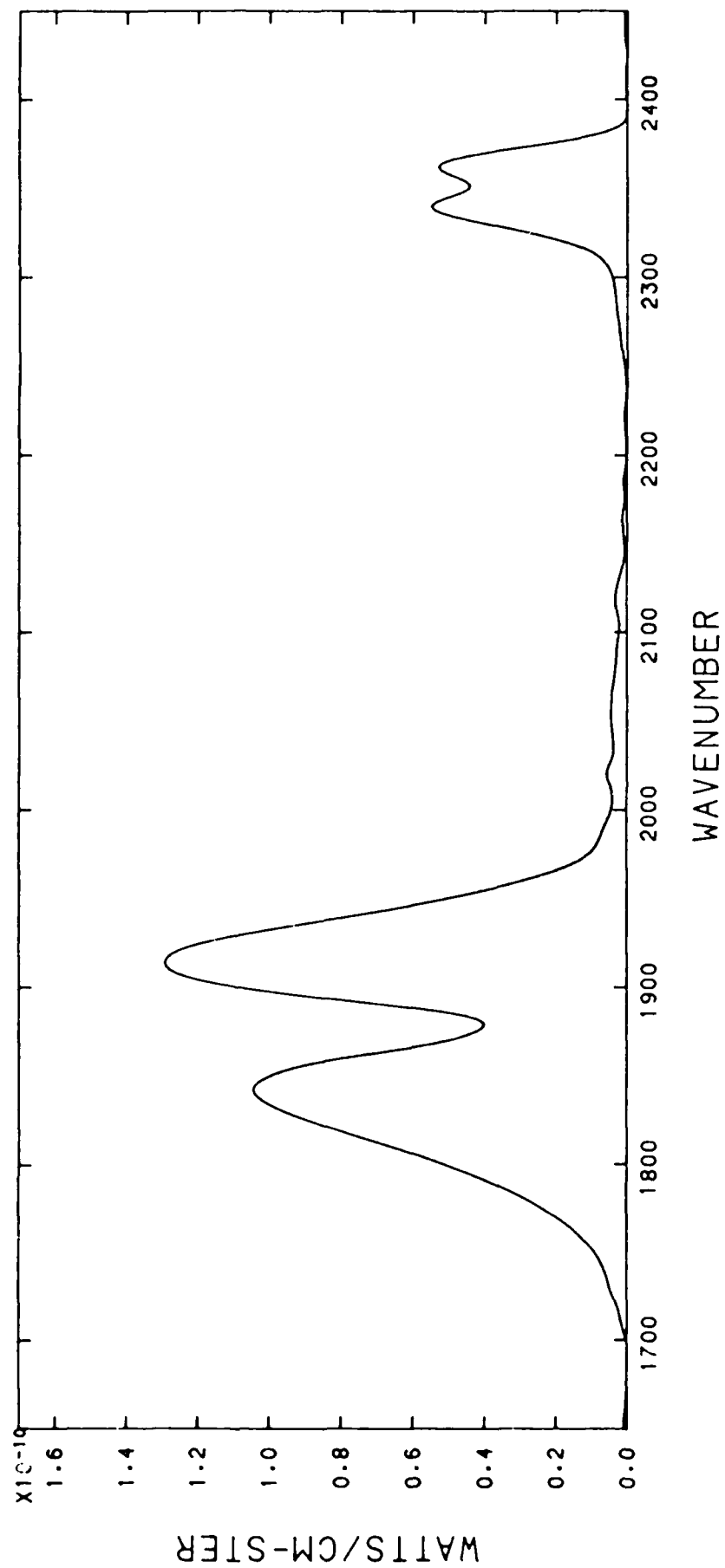


FILE 123, TIME 9:11: 2.370, ALT 99.3- 99.0 KM



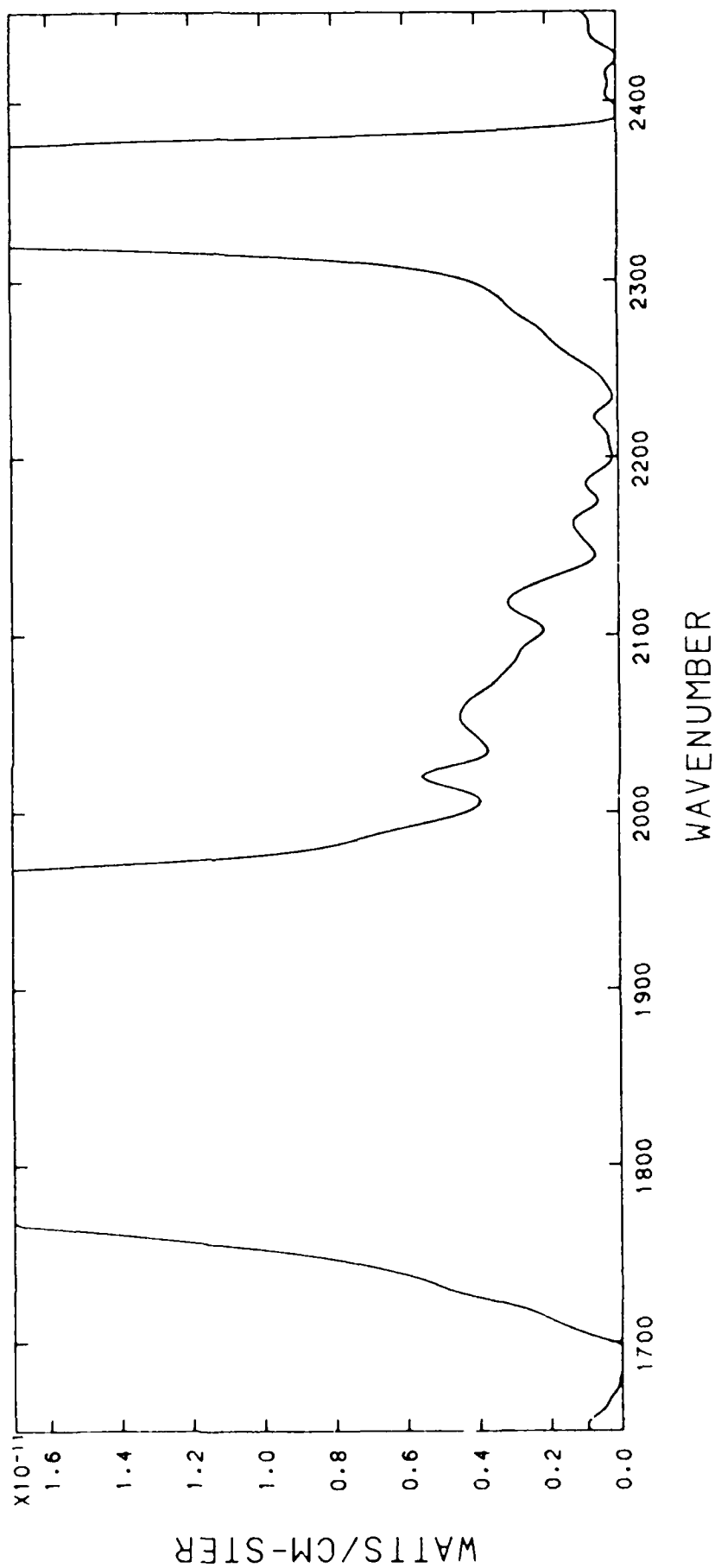
FILE 123, TIME 9:11: 2.370, ALT 99.3- 99.0 KM



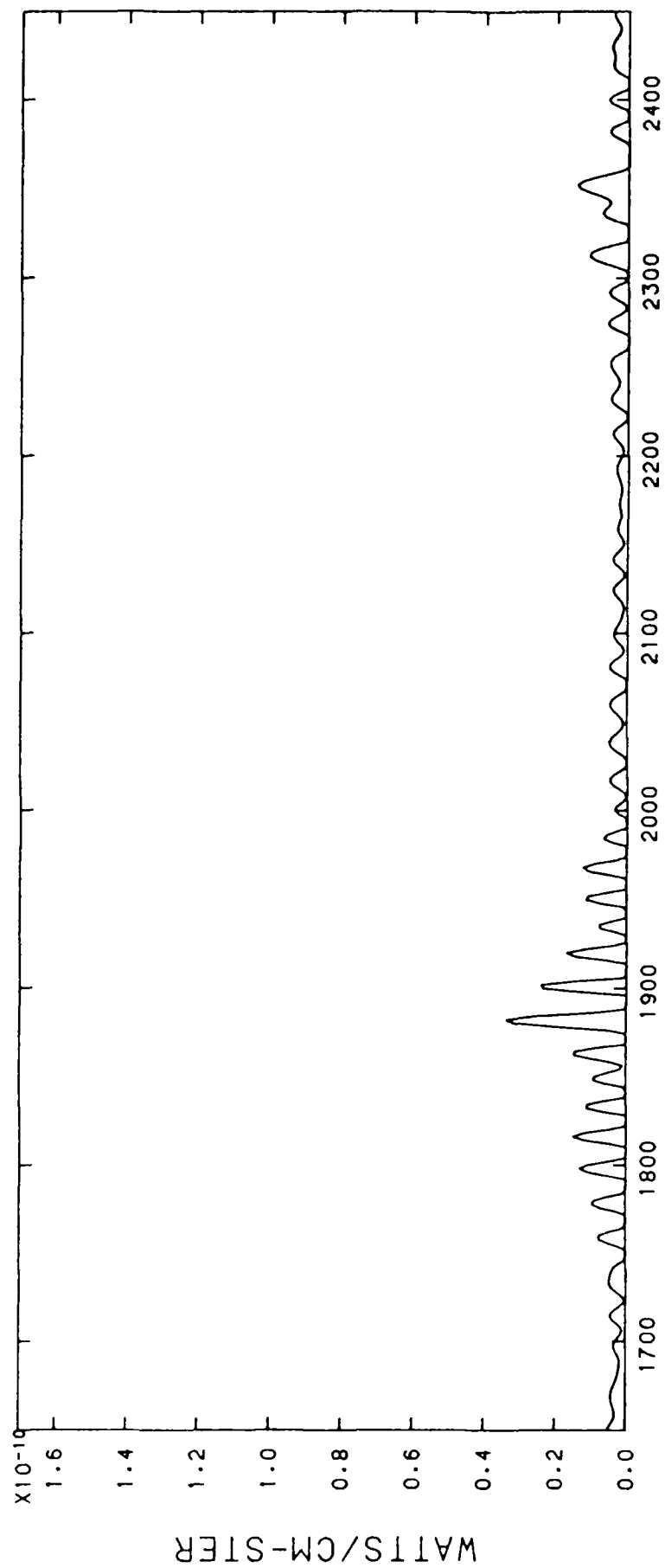


FILE 124, TIME 9:11: 5.126, ALT 96.9- 96.6 KM

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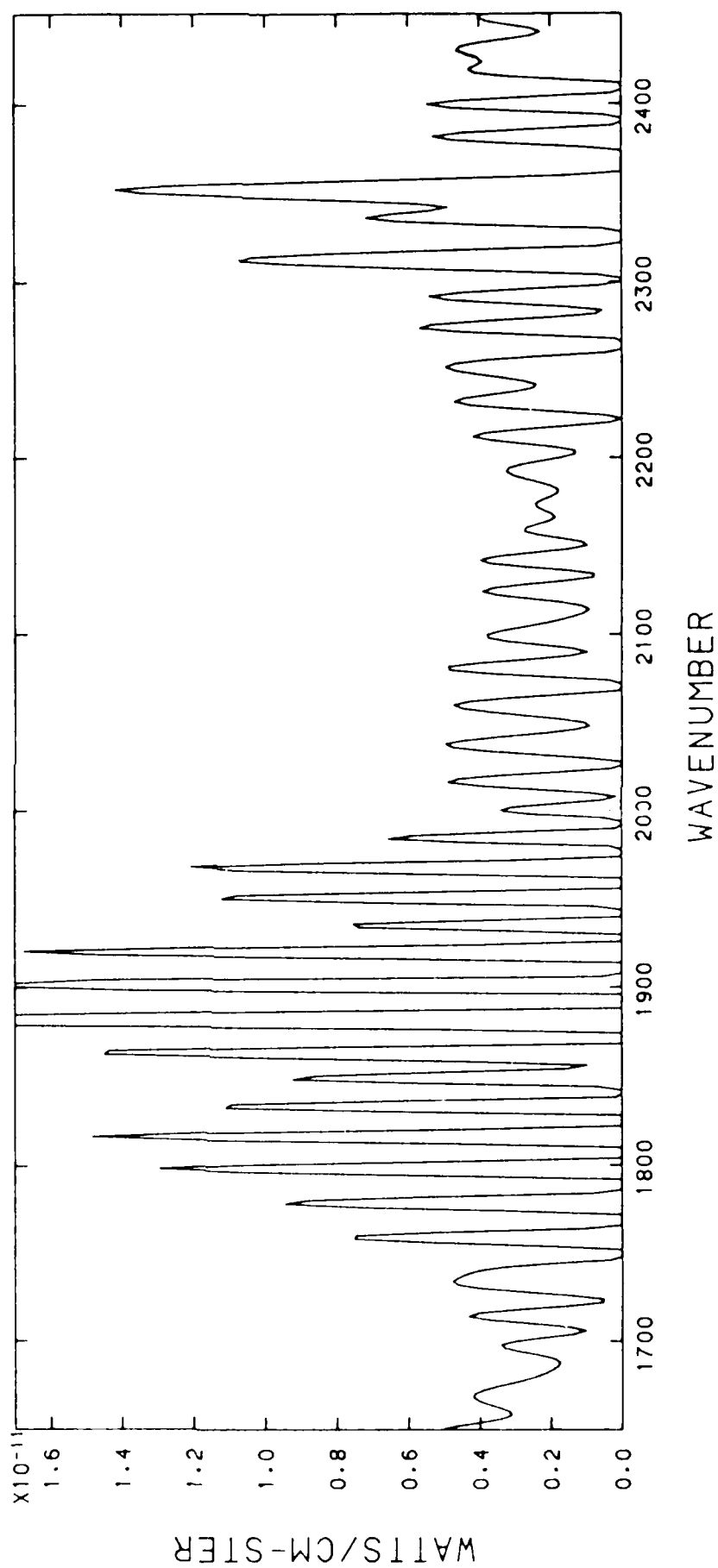
FILE 124, TIME 9:11: 5.126, ALT 96.9- 96.6 KM



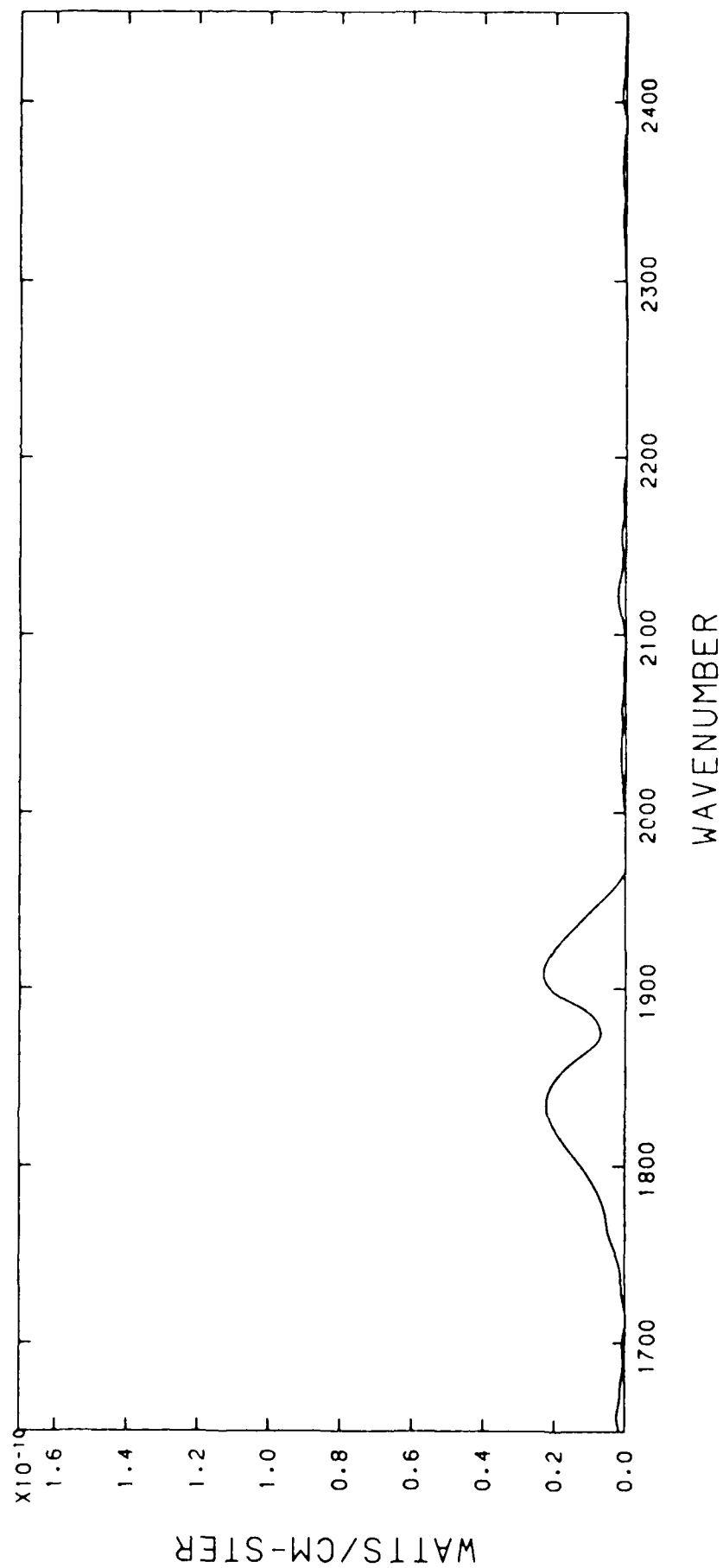
WAVENUMBER

FILE 125, TIME 9:11: 5.548, ALT 96.5- 96.3 KM

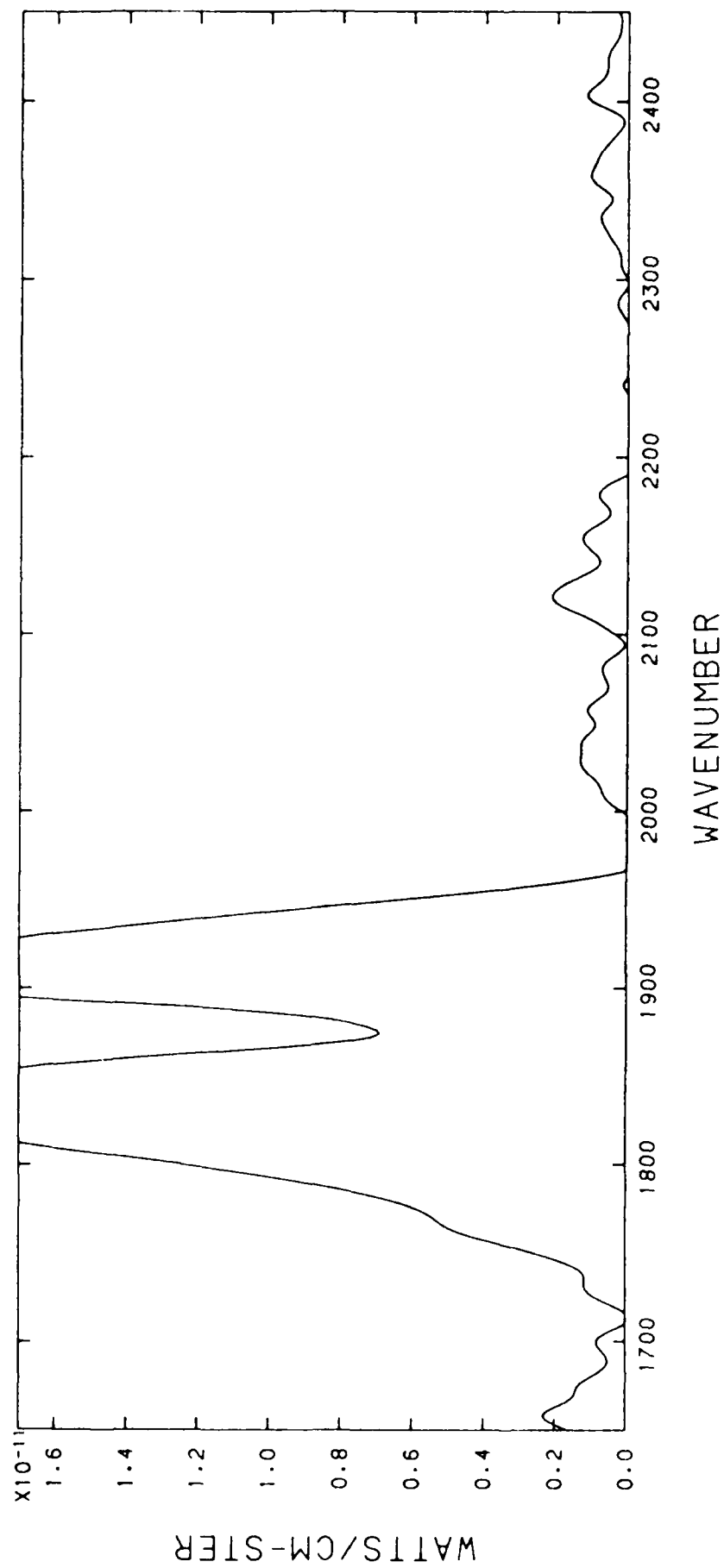
253



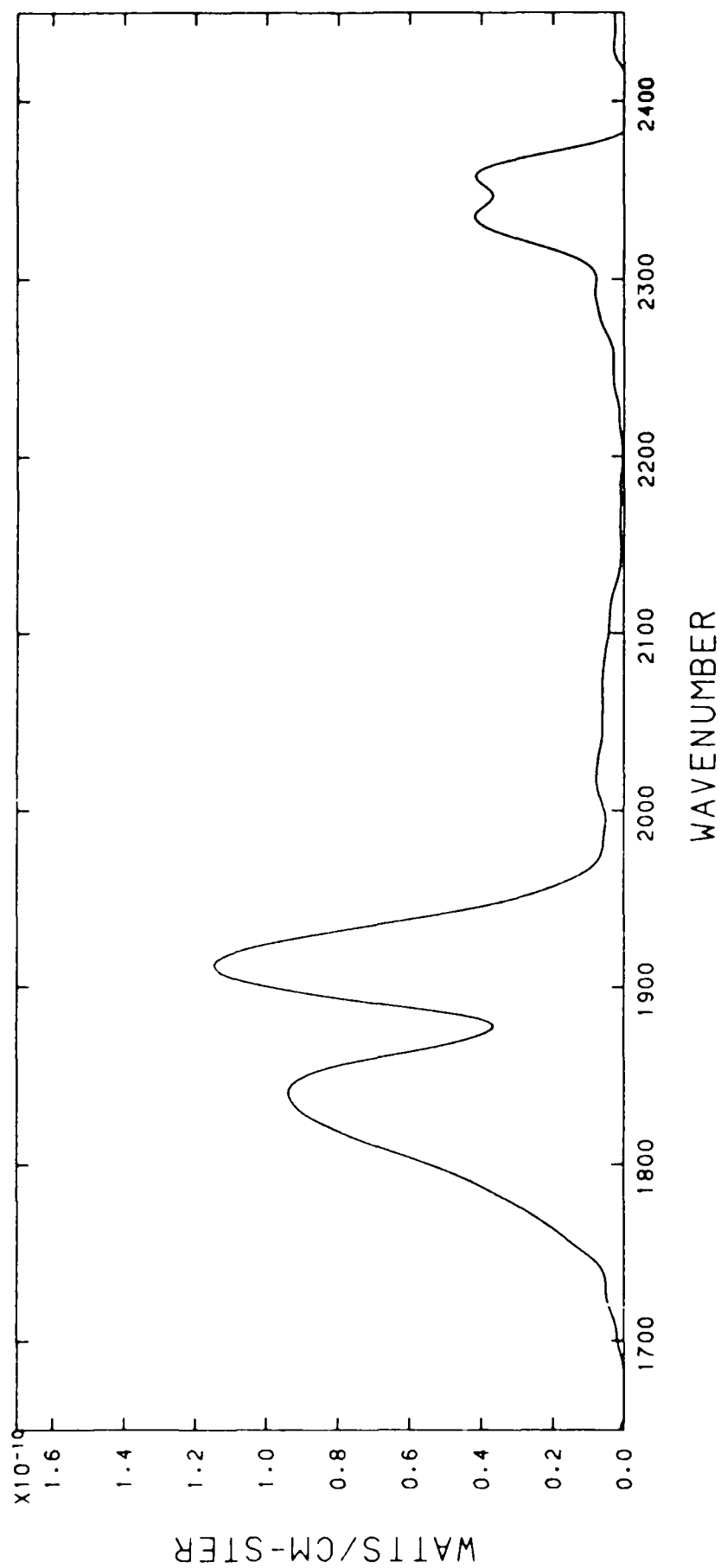
FILE 125, TIME 9:11: 5.548, ALT 96.5- 96.3 KM



FILE 126, TIME 9:11: 8.374, ALT 93.9- 93.6 KM

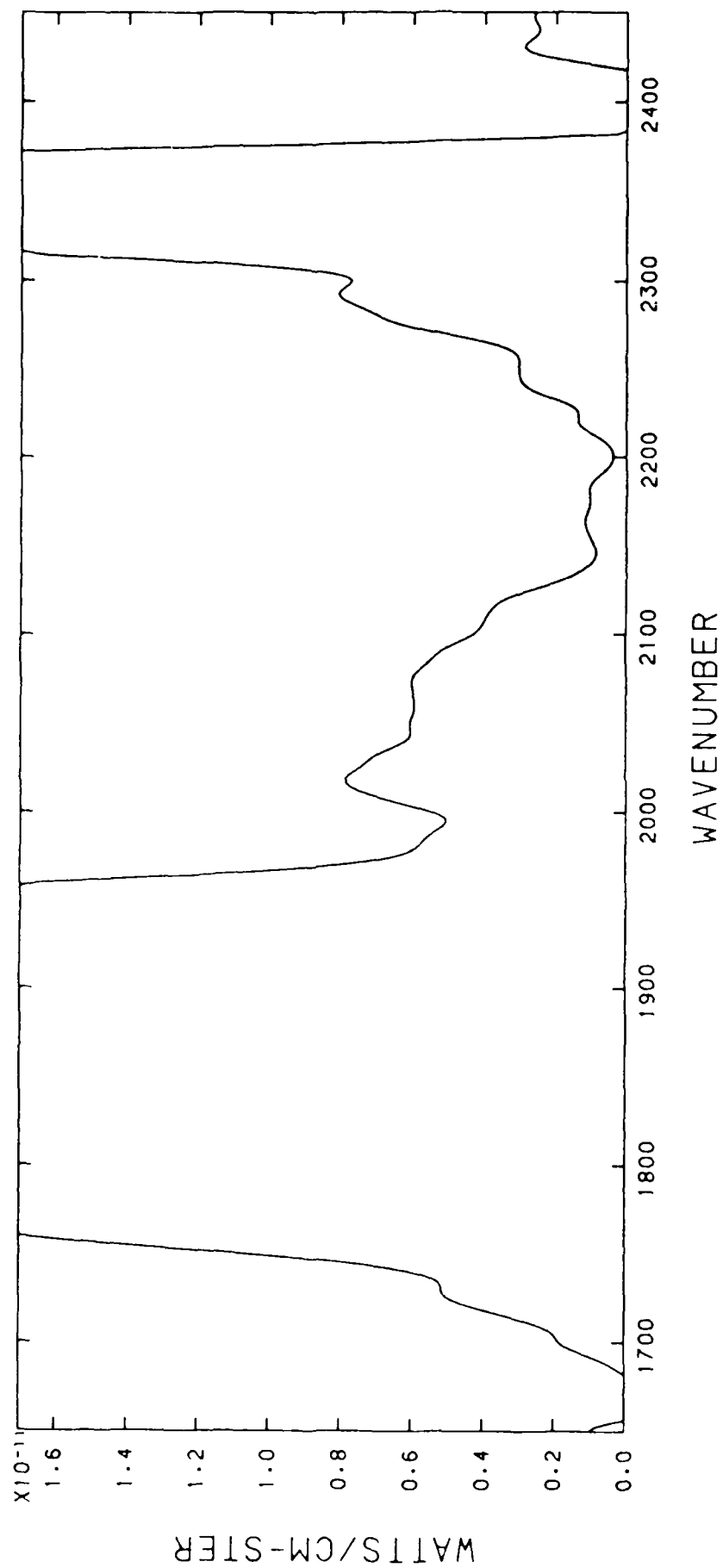


FILE 126, TIME 9:11: 8.374, ALT 93.9- 93.6 KM



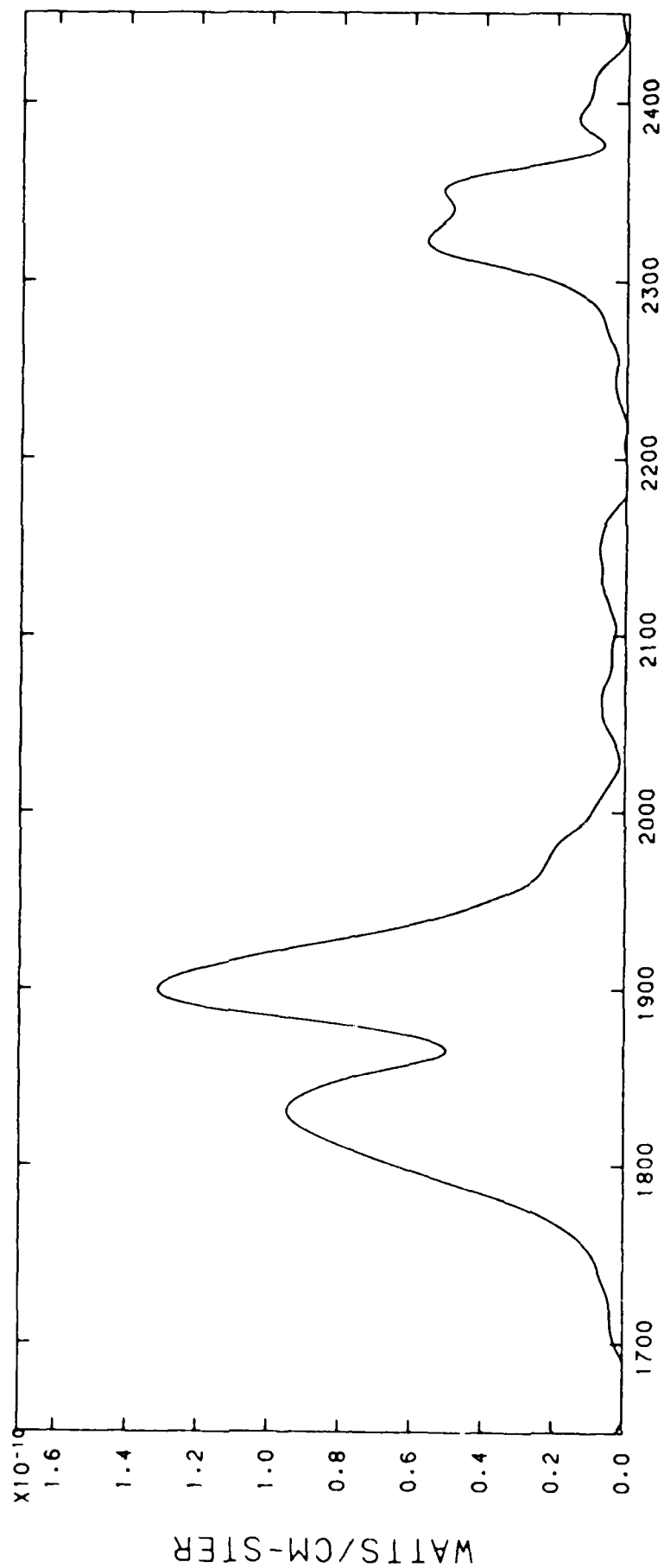
FILE 127, TIME 9:11: 8.870, ALT 93.5- 93.2 KM

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FILE 127, TIME 9:11: 8.870, ALT 93.5- 93.2 KM

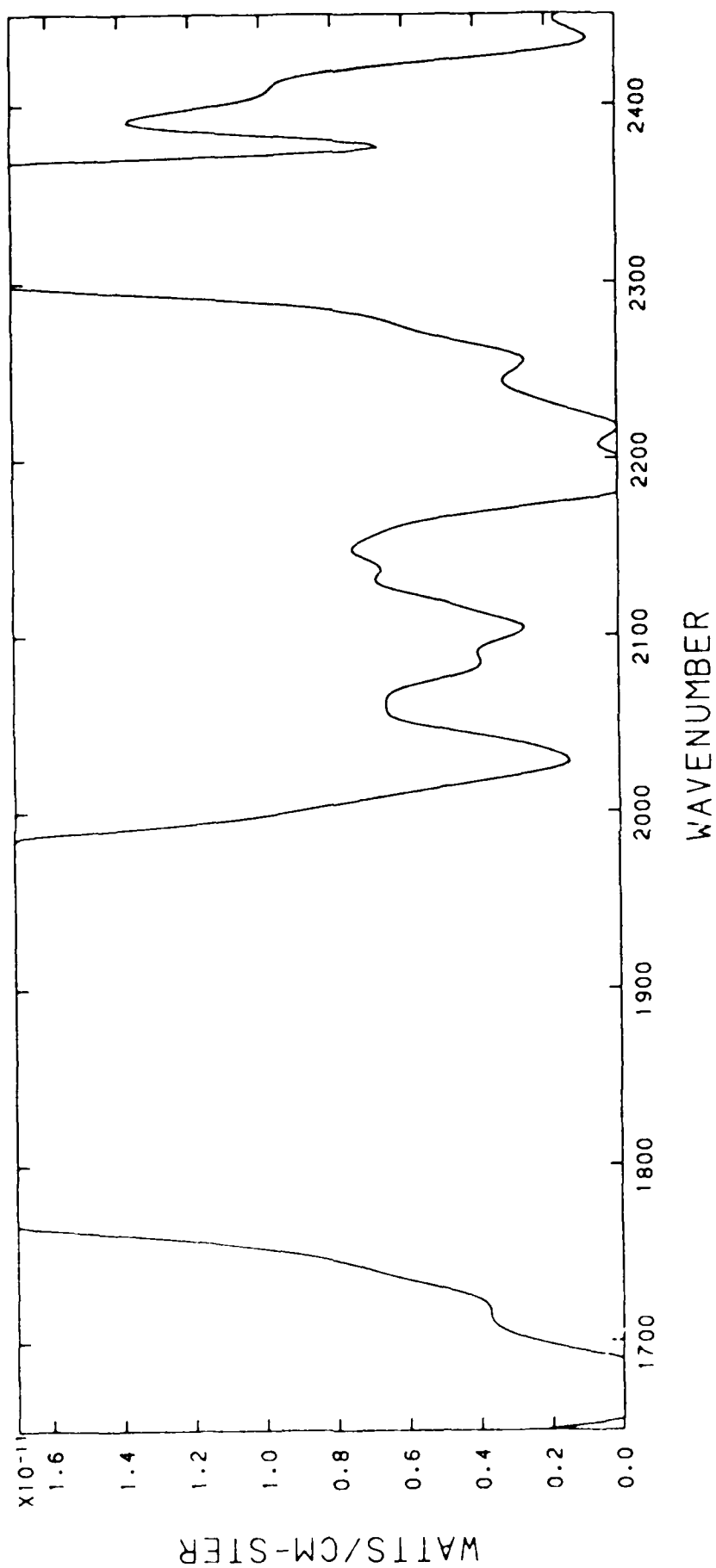




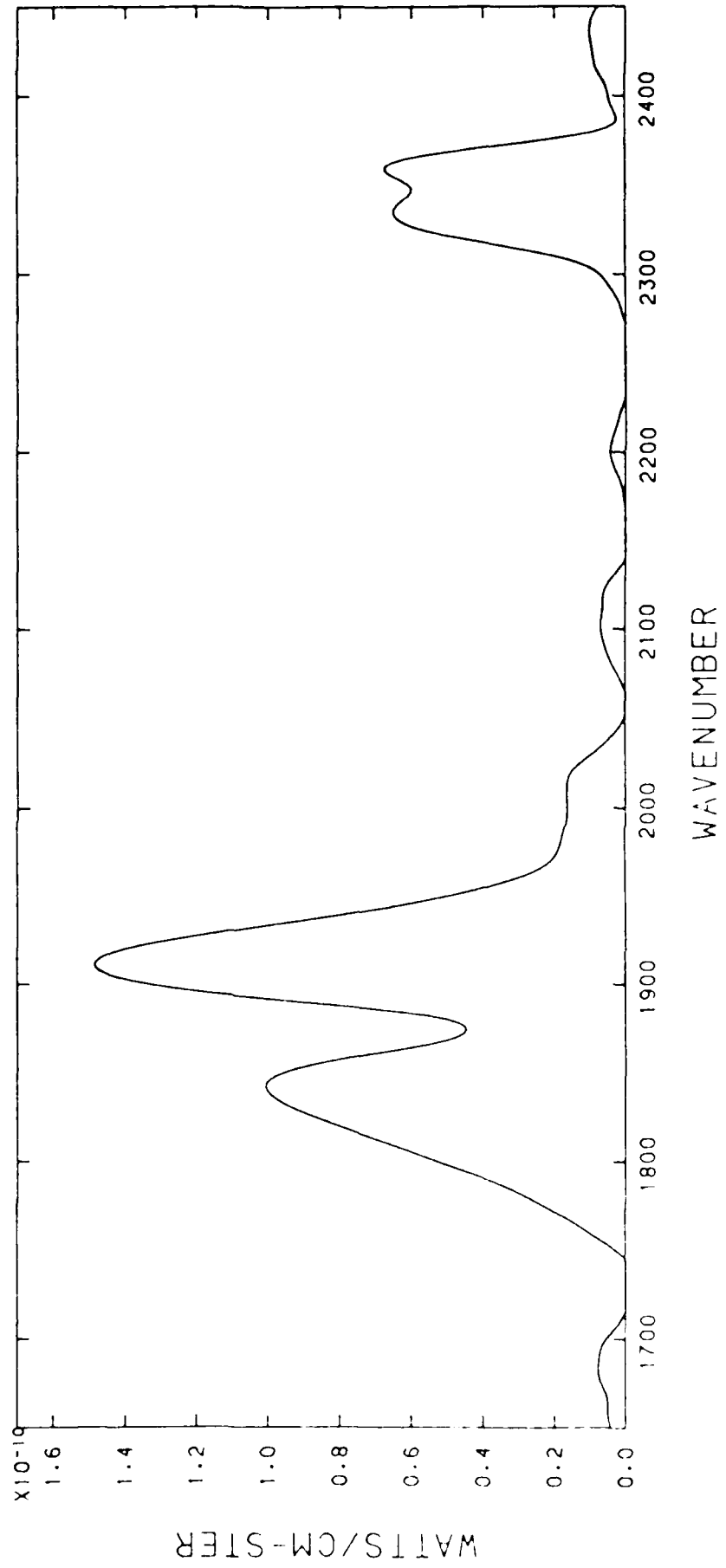
WAVENUMBER

FILE 128, TIME 9:11:11.622, ALT 90.9- 90.6 KM

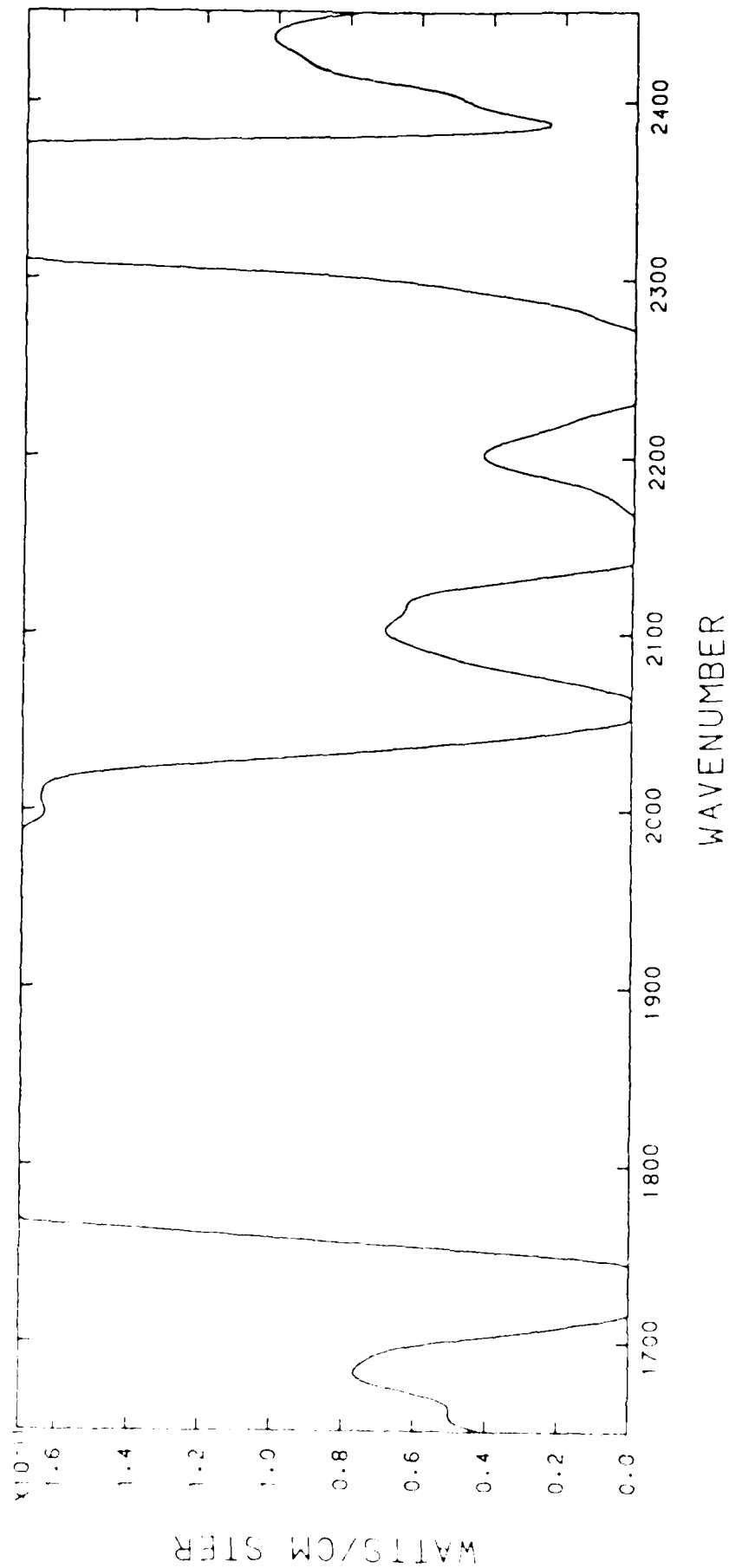
30-NOV-83 09:36



FILE 128, TIME 9:11:11.622, ALT 90.9- 90.6 KM

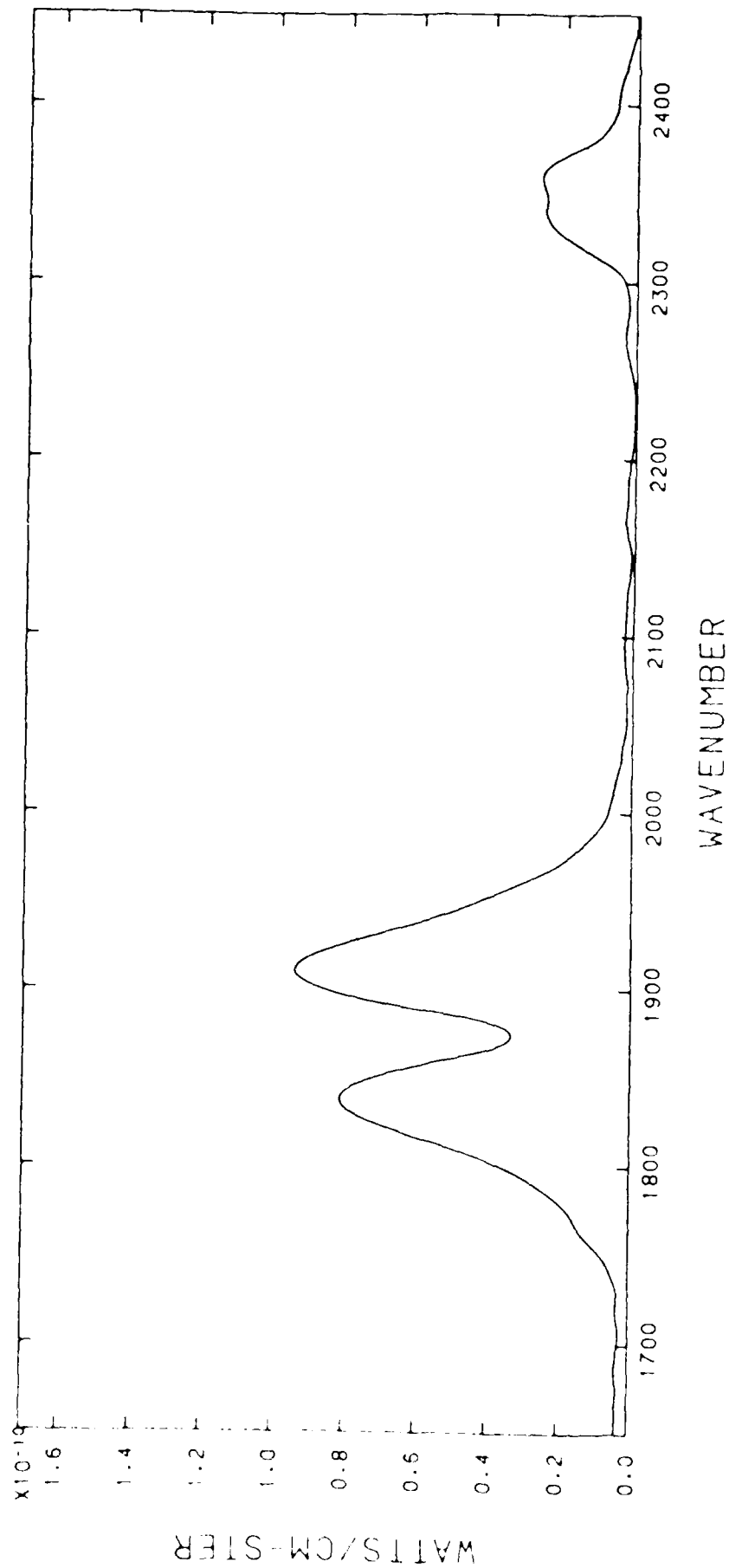


FILE 129, TIME 9:11:12.118, ALT 90.4- 90.1 KM



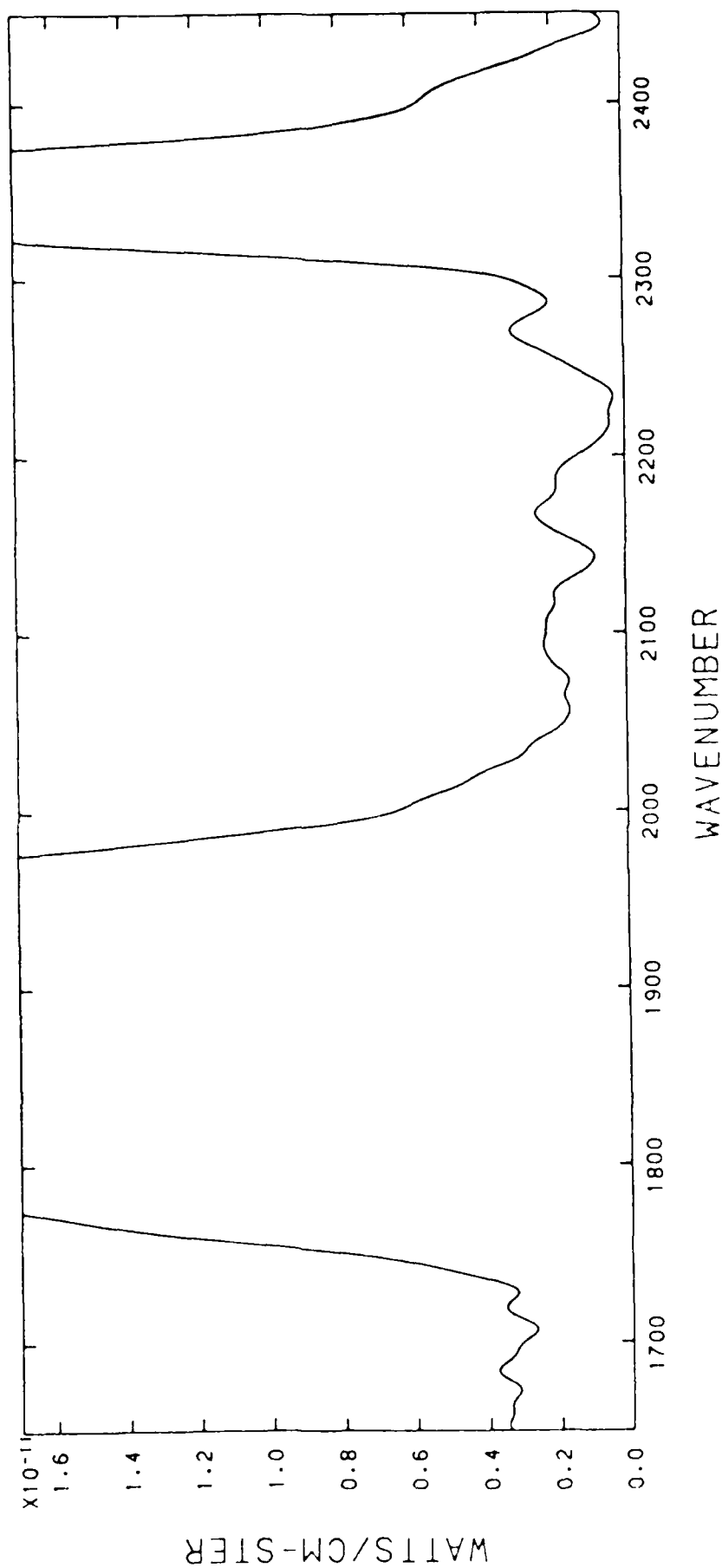
FILE 129, TIME 9:11:12.118, ALT 90.4- 90.1 KM

30 NOV 83 09:36

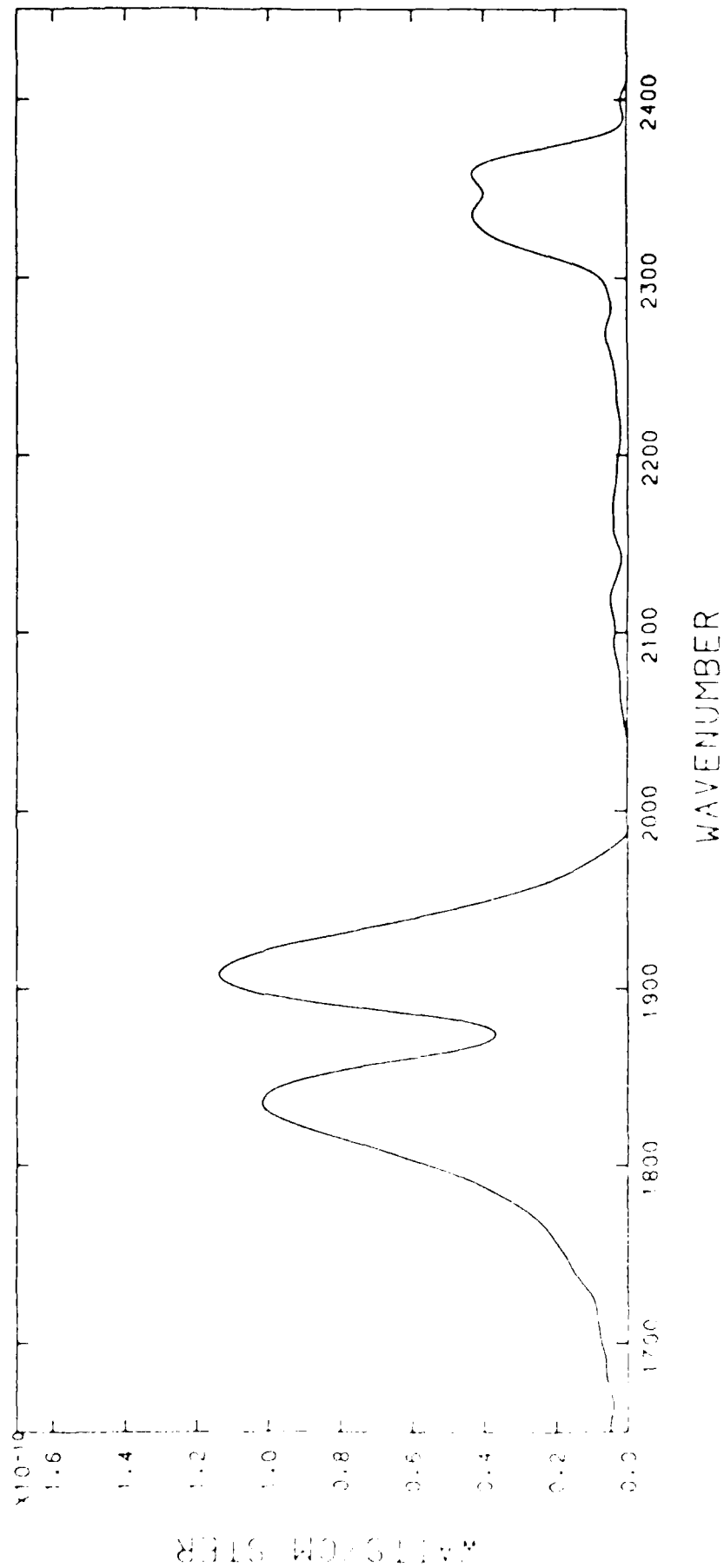


FILE 130, TIME 9:11:14.872, ALT 87.7- 87.4 KM

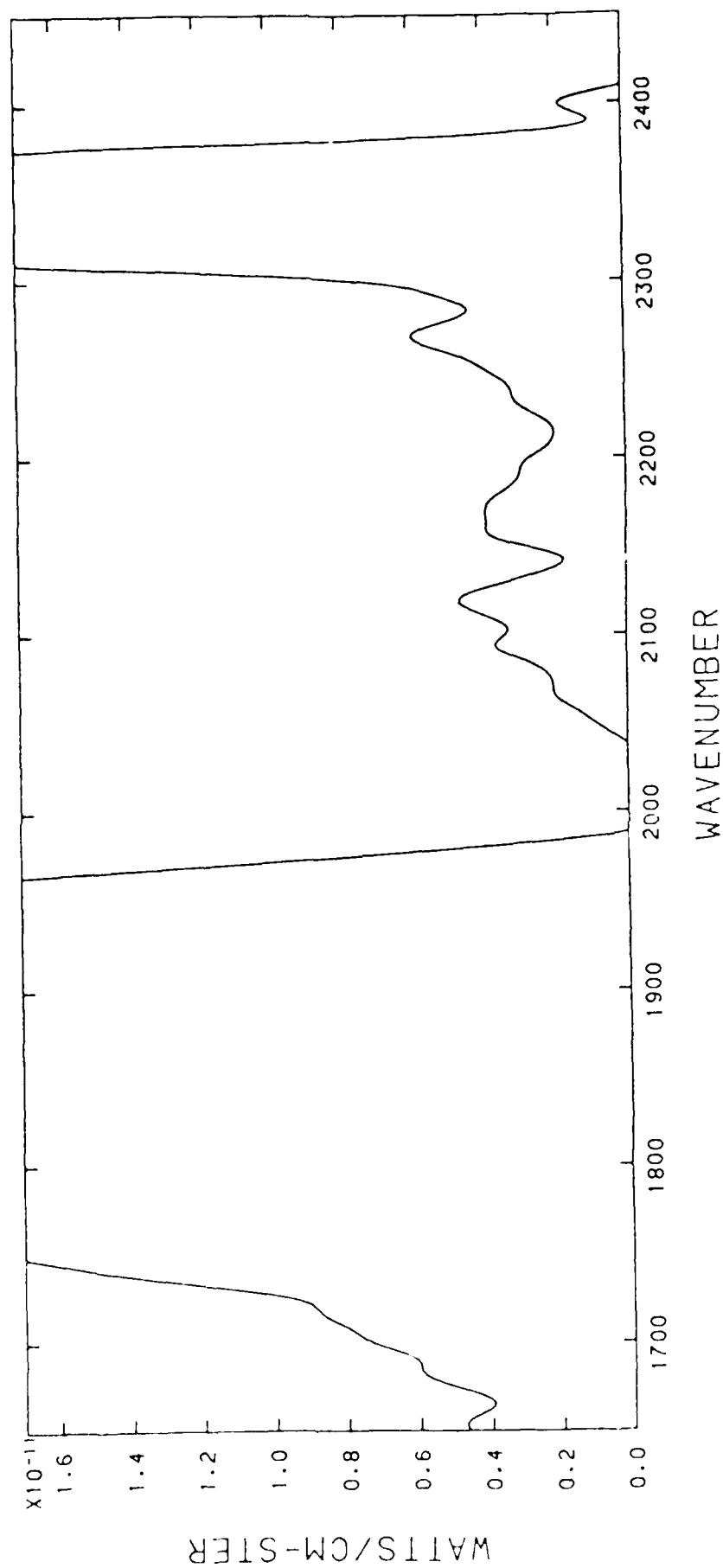
30-NOV-83 09:36



FILE 130, TIME 9:11:14.872, ALT 87.7- 87.4 KM

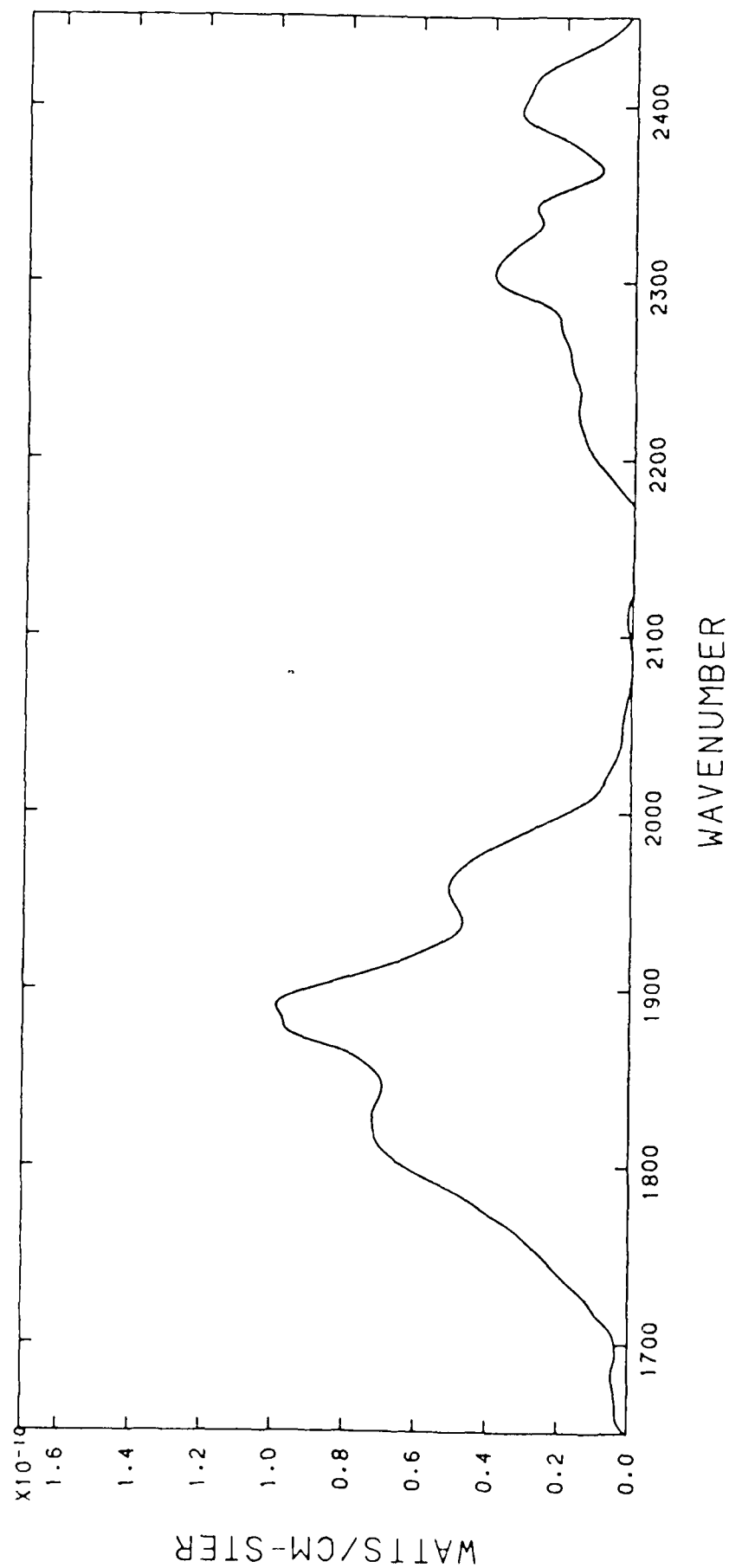


FILE 131, TIME 9:11:15.366, ALT 87.3- 86.9 KM



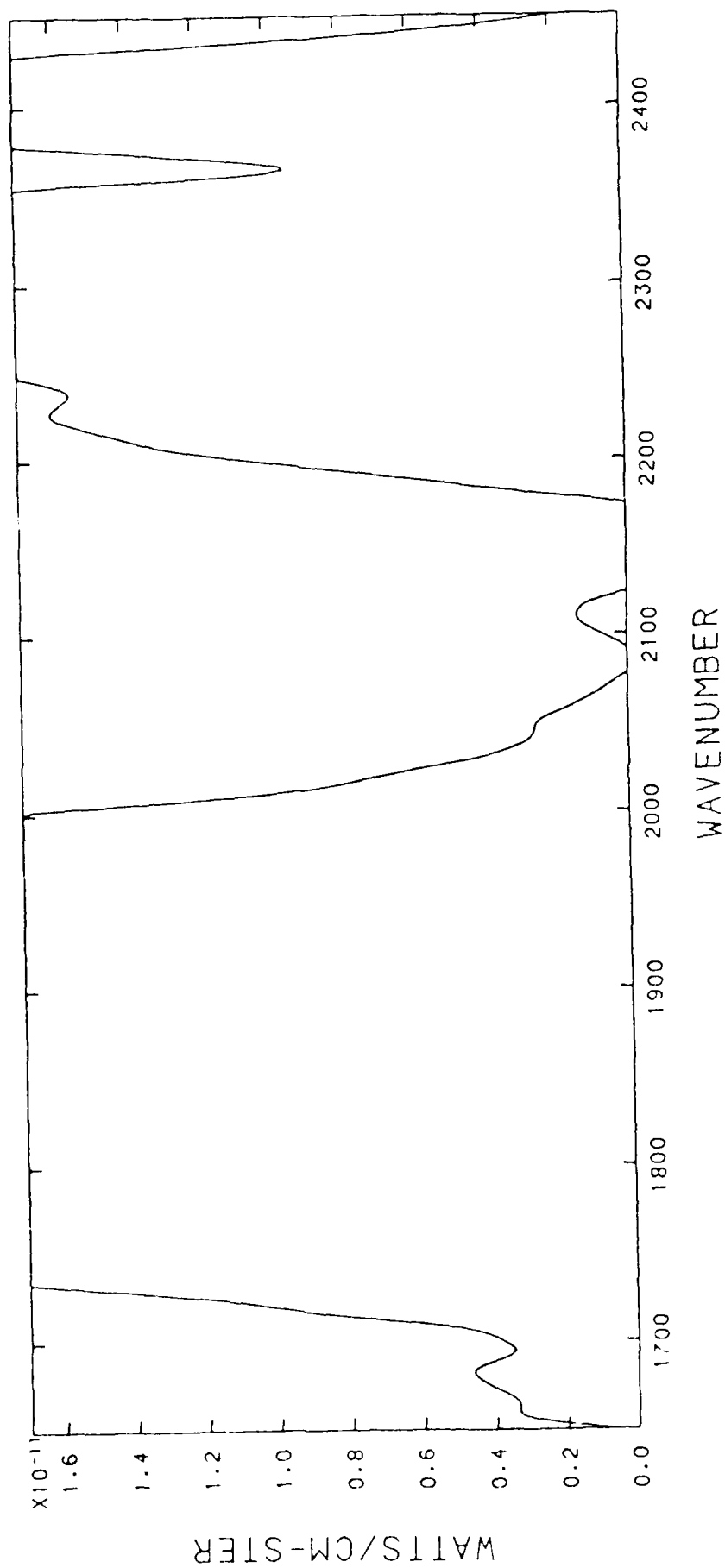
FILE 131, TIME 9:11:15.366, ALT 87.3- 86.9 KM



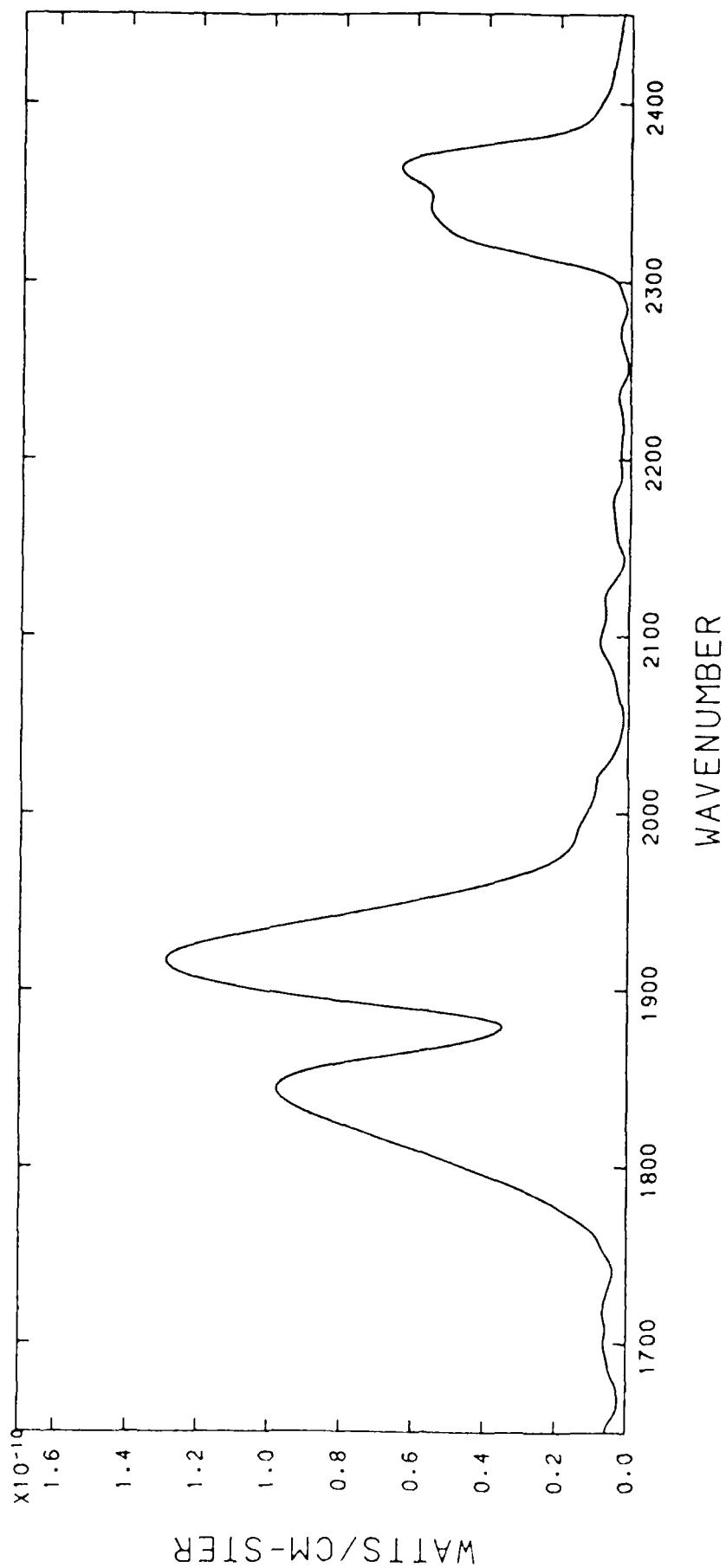


FILE 132, TIME 9:11:18.122, ALT 84.5- 84.1 KM

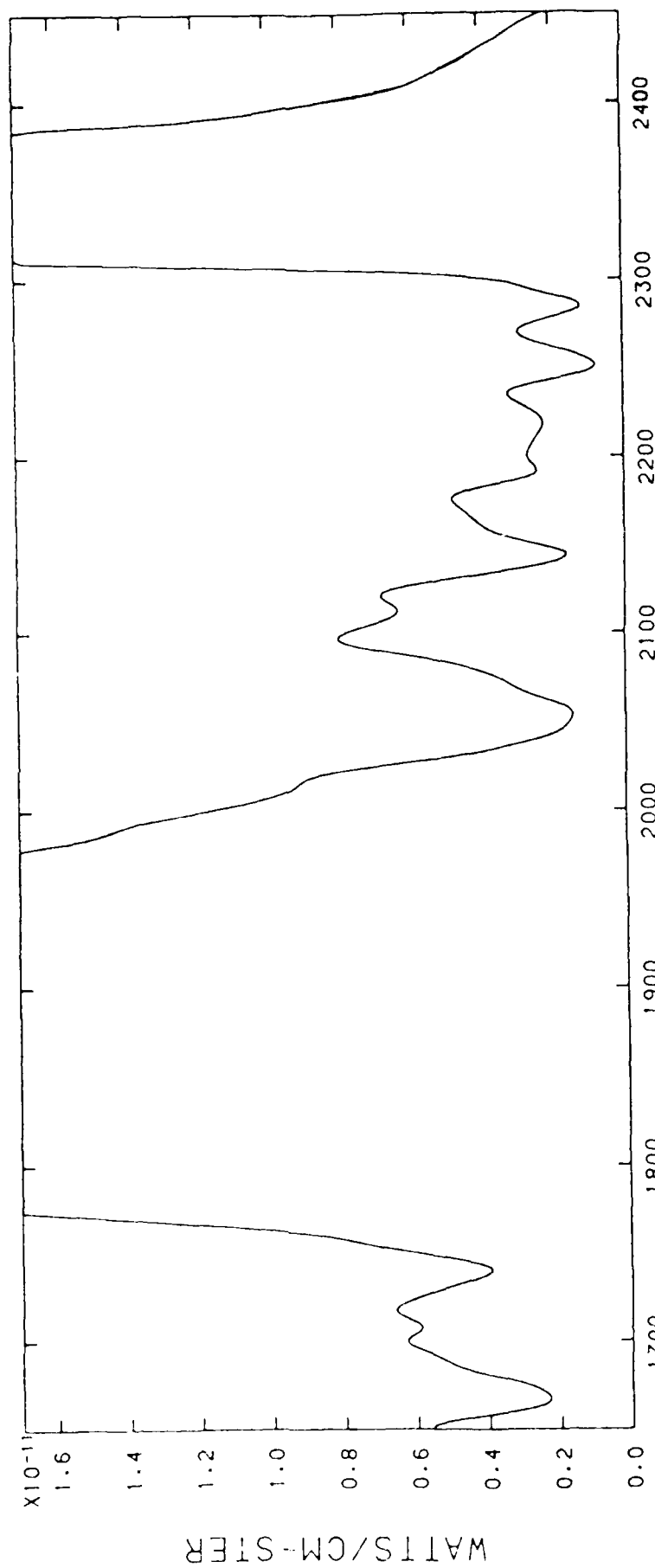
30-NOV-83 09.36



FILE 132, TIME 9:11:18.122, ALT 84.5- 84.1 KM

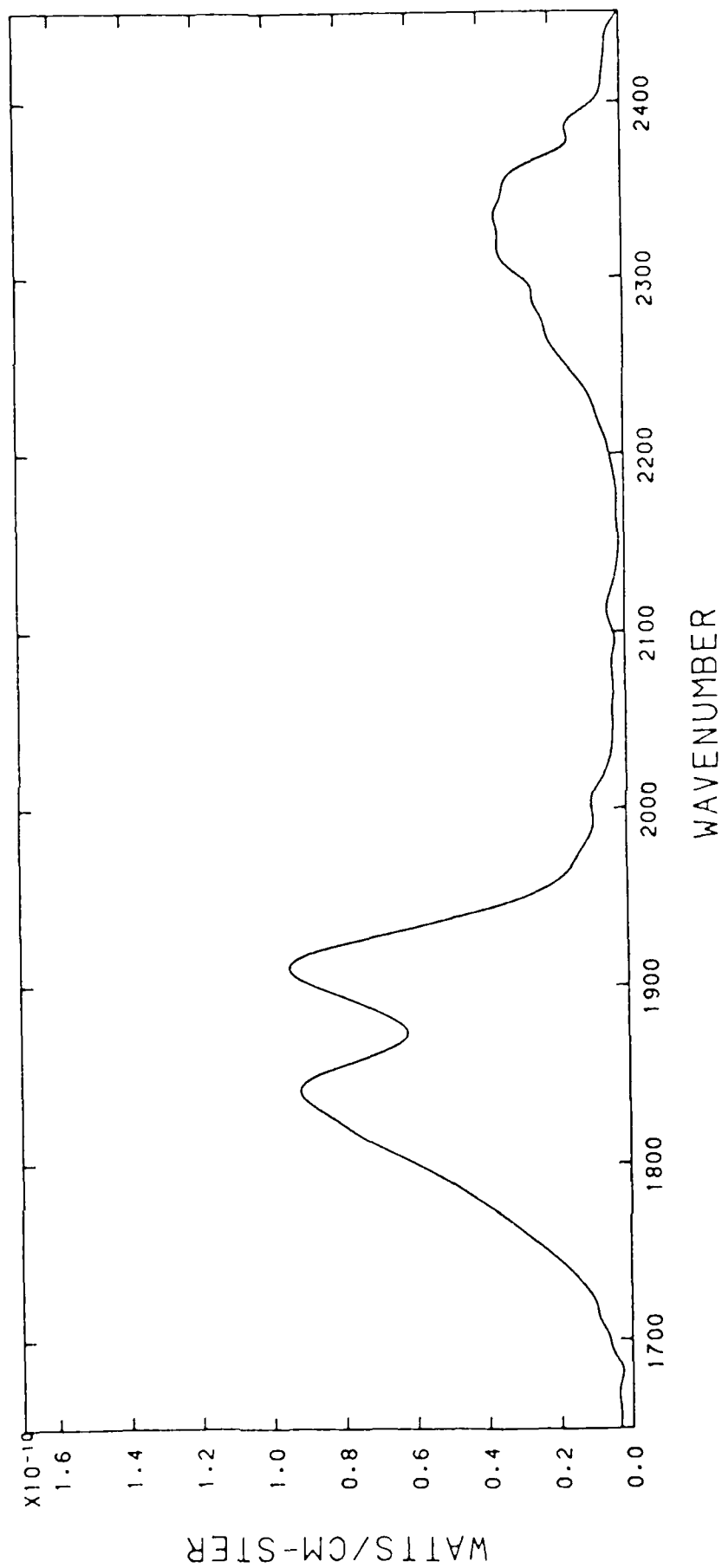


FILE 133, TIME 9:11:18.618, ALT 84.0- 83.6 KM

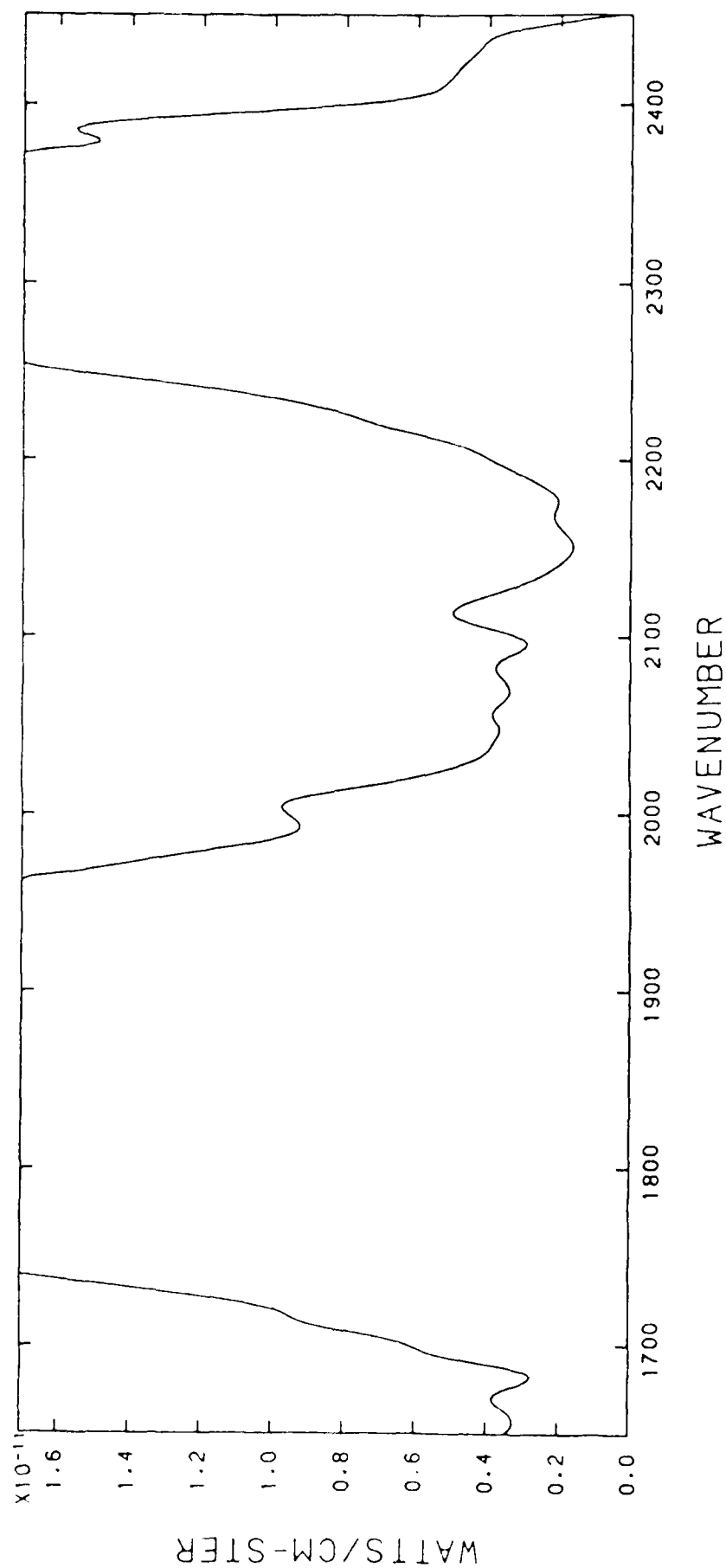


WAVENUMBER

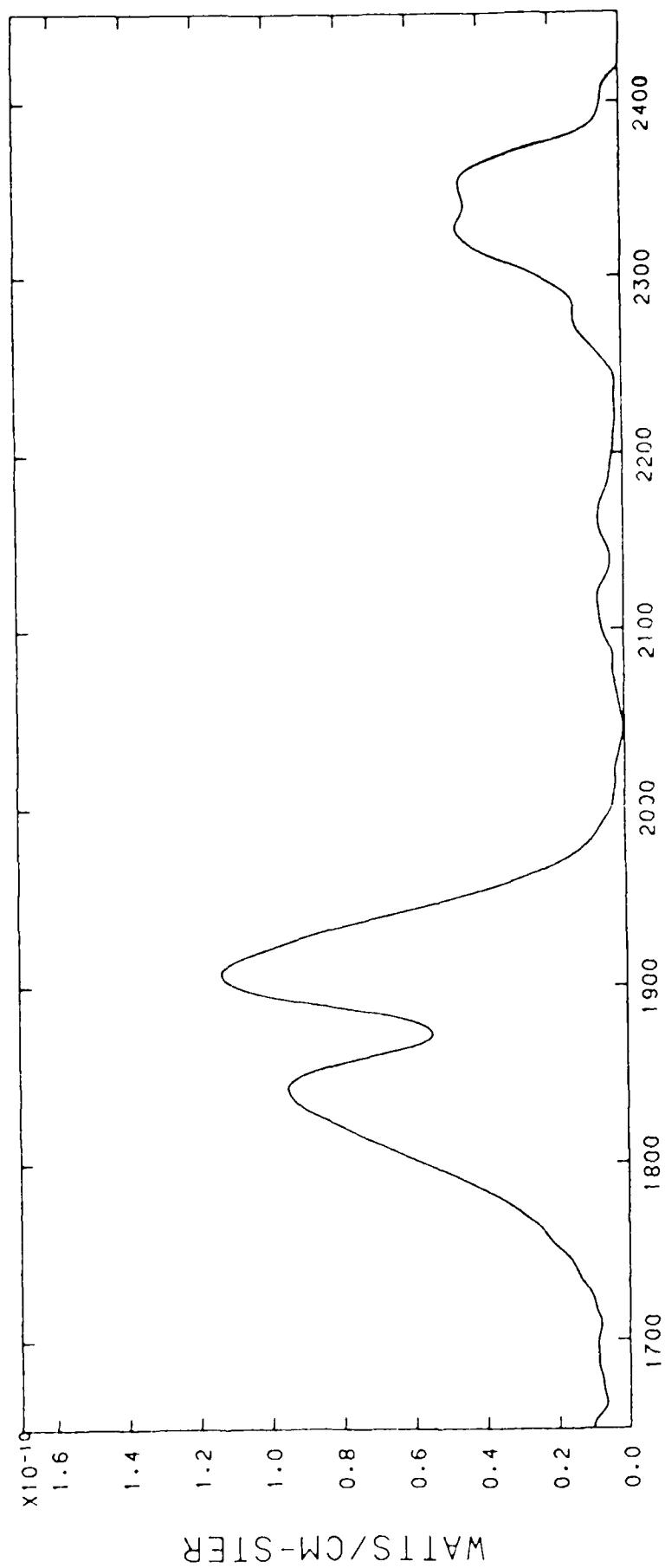
FILE 133. TIME 9:11:18.618, ALT 84.0- 83.6 KM



FILE 134, TIME 9:11:21.372, ALT 81.1- 80.8 KM

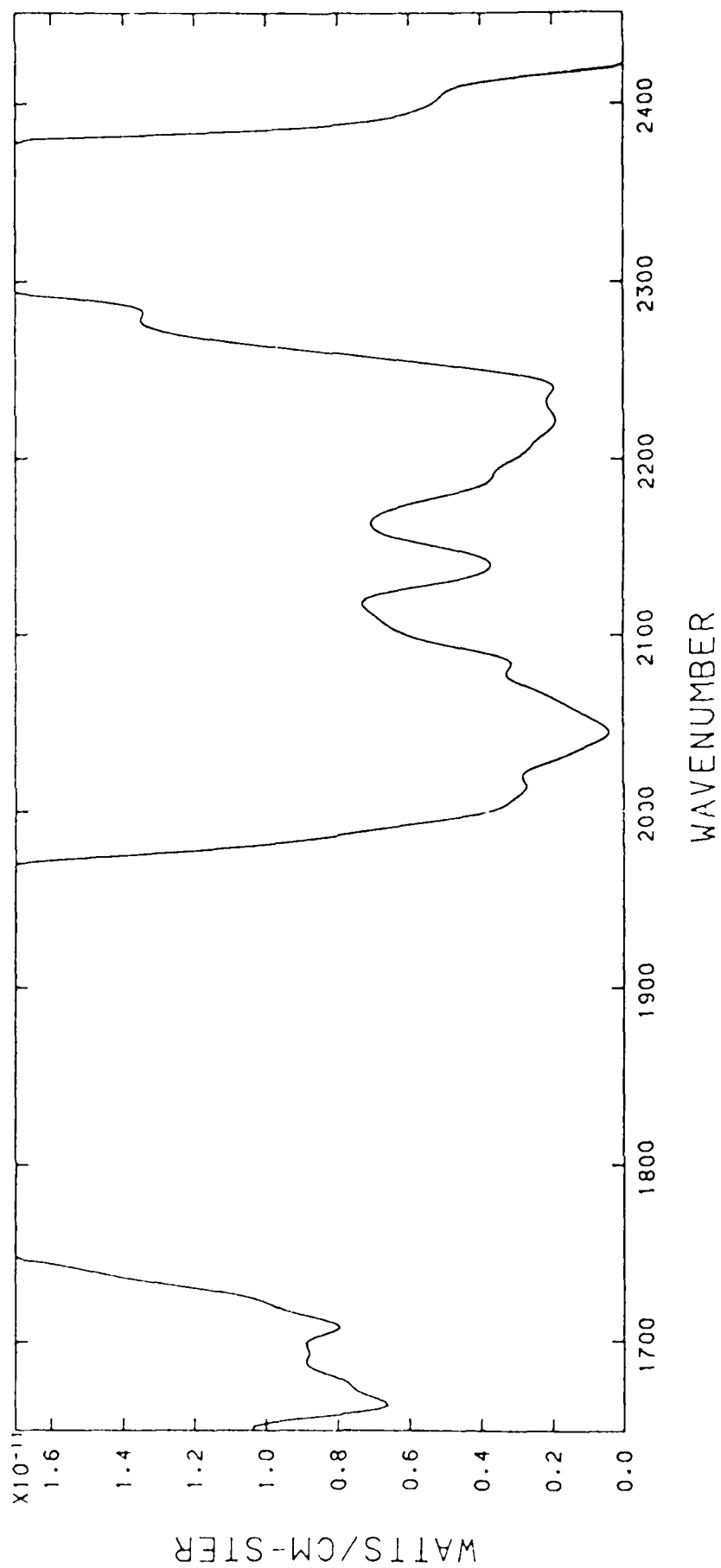


FILE 134, TIME 9:11:21.372, ALT 81.1- 80.8 KM



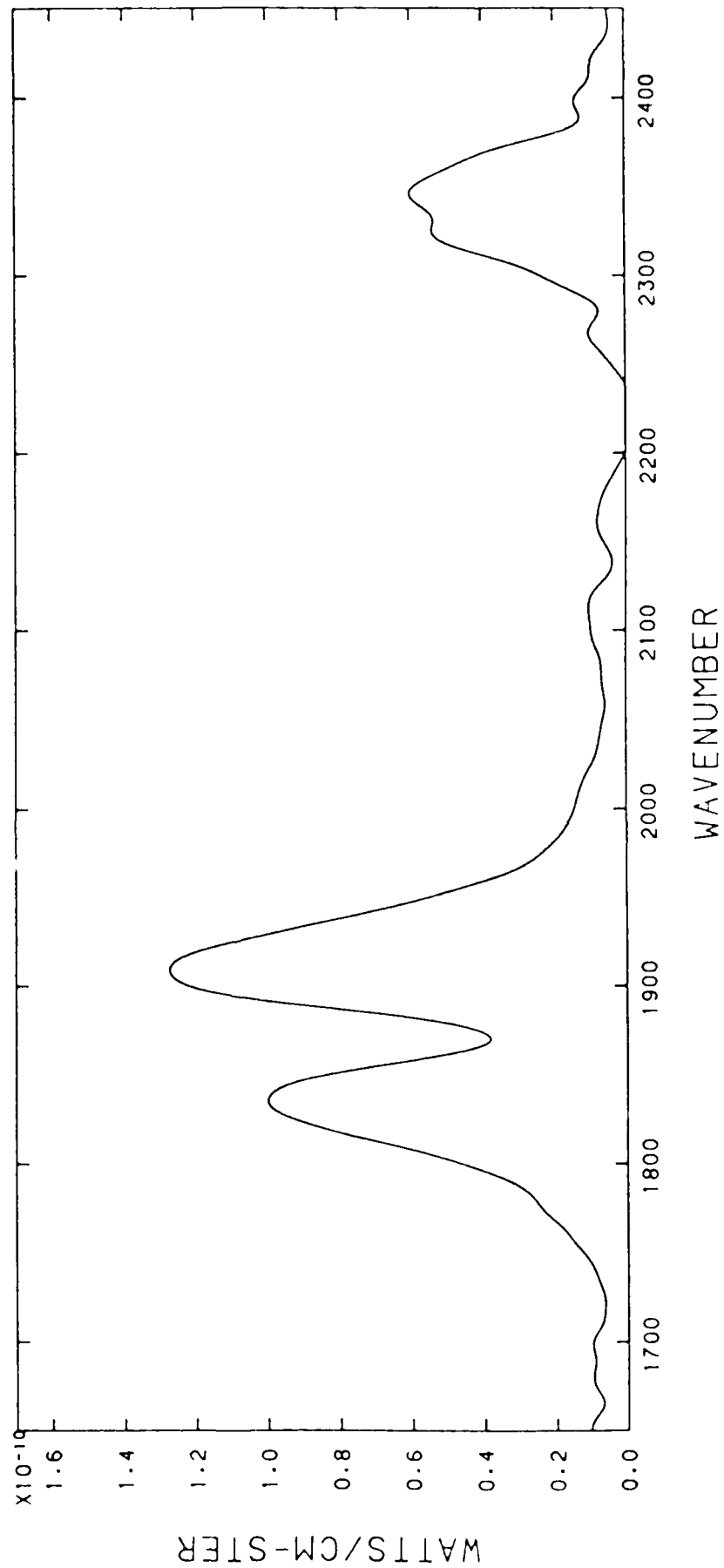
WAVENUMBER

FILE 135, TIME 9:11:21.868, ALT 80.6- 80.3 KM

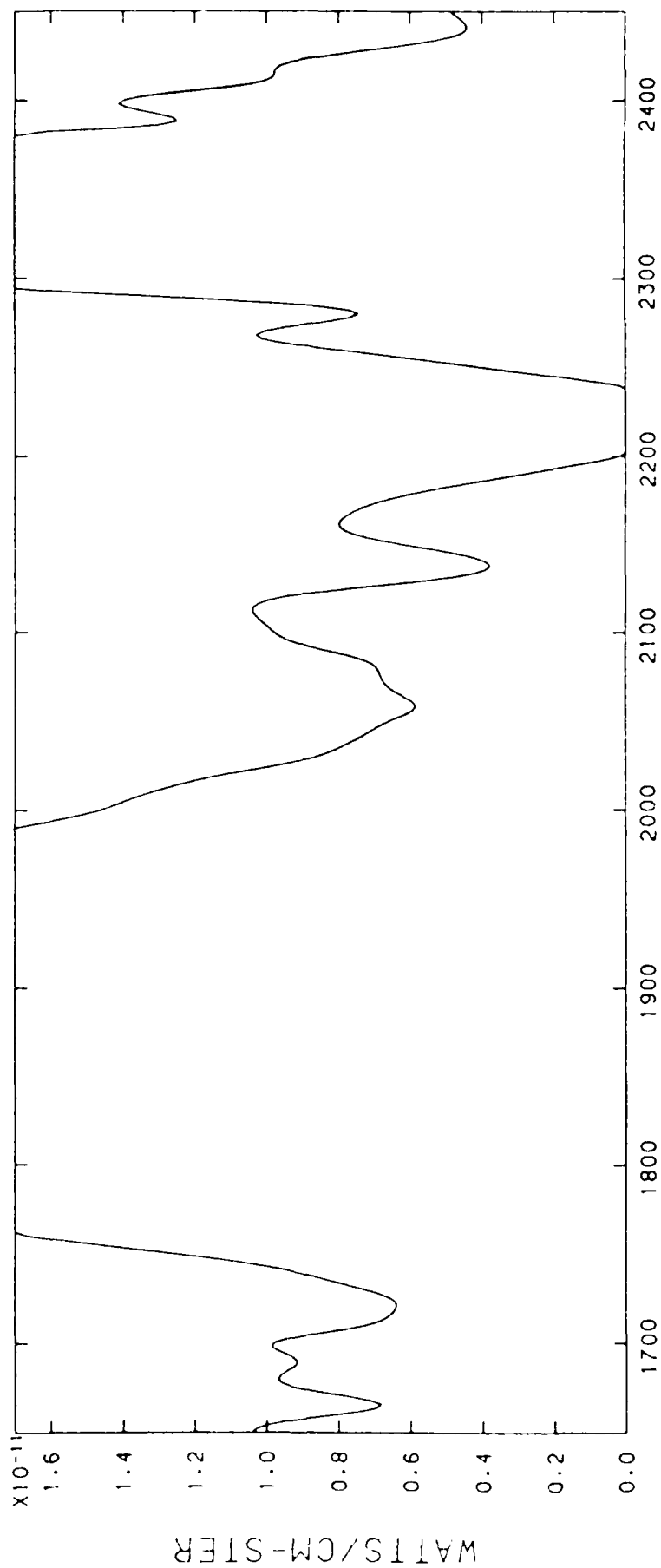


FILE 135, TIME 9:11:21.868, ALT 80.6- 80.3 KM

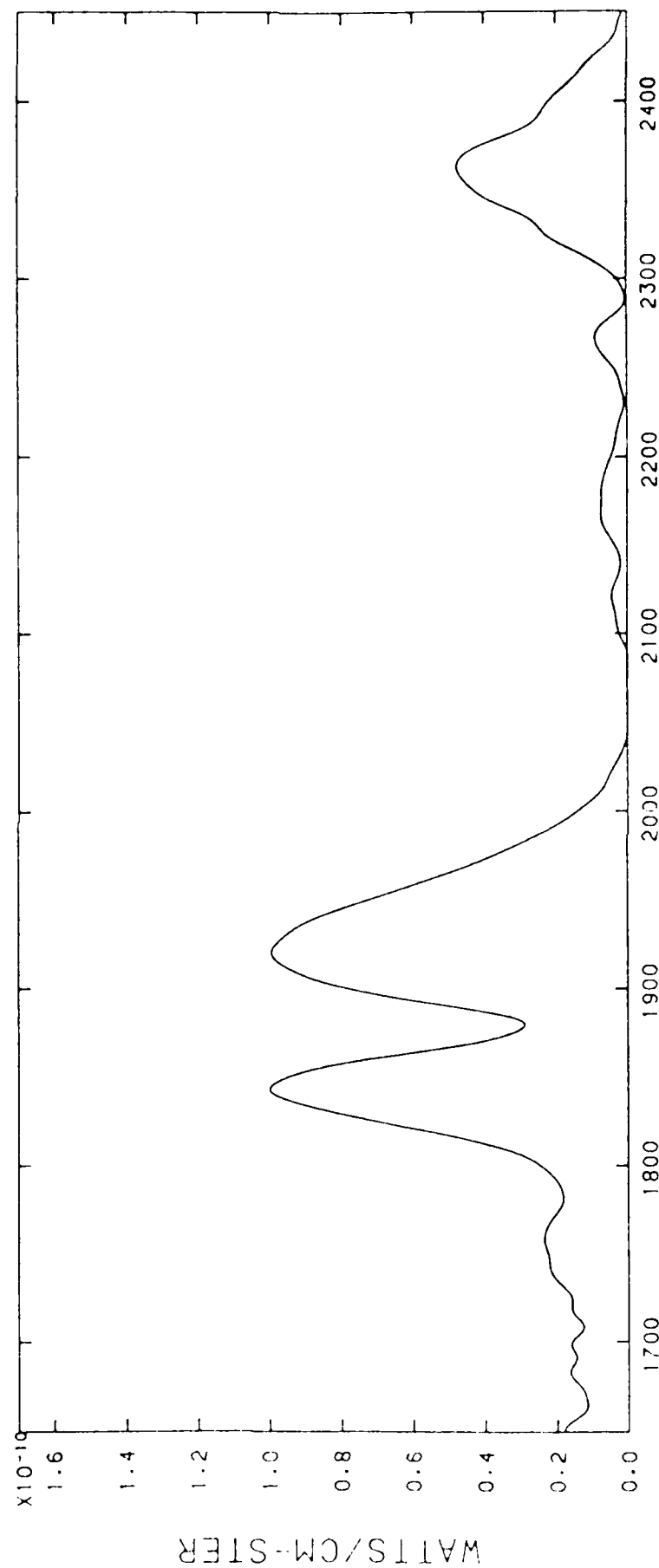




FILE 136, TIME 9:11:24.622, ALT 77.7- 77.3 KM



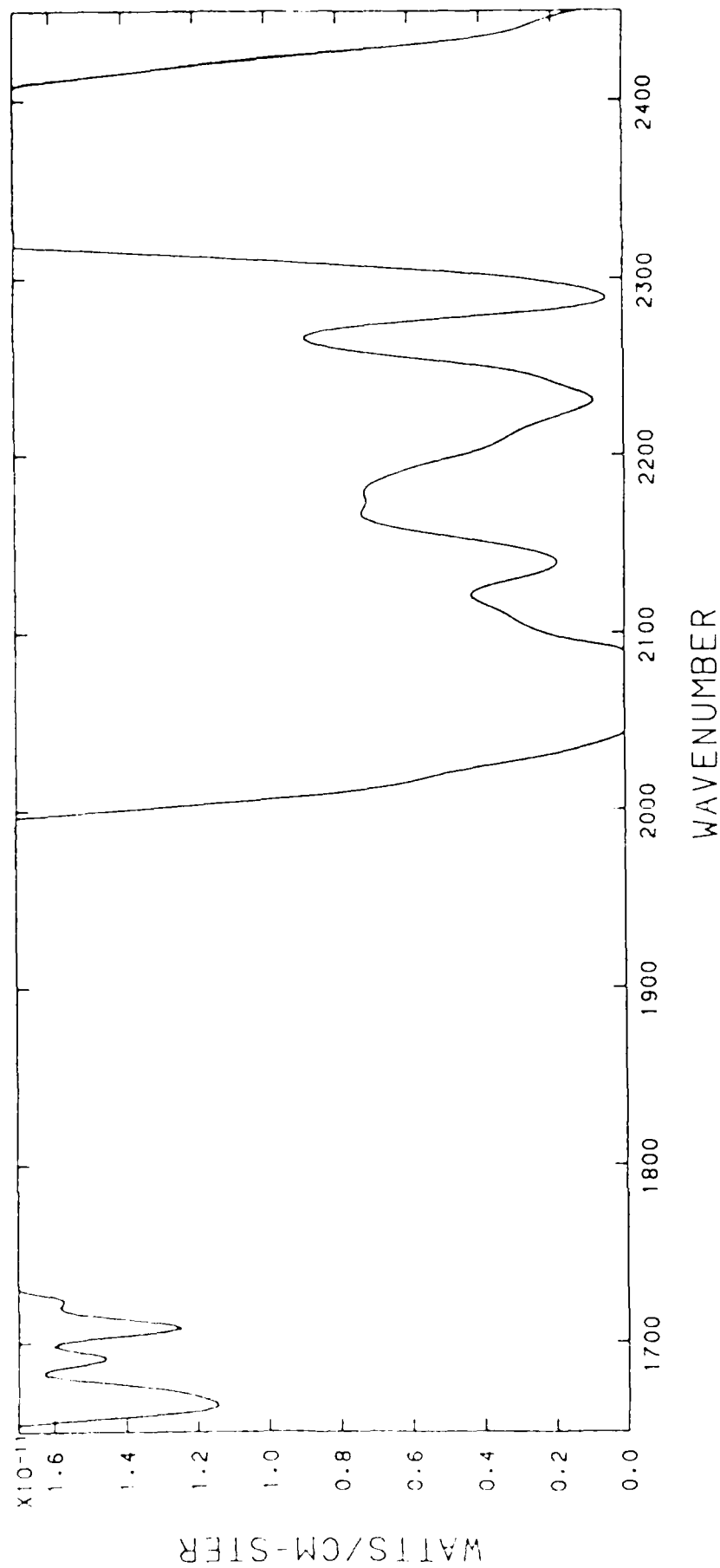
FILE 136, TIME 9:11:24.622, ALT 77.7- 77.3 KM



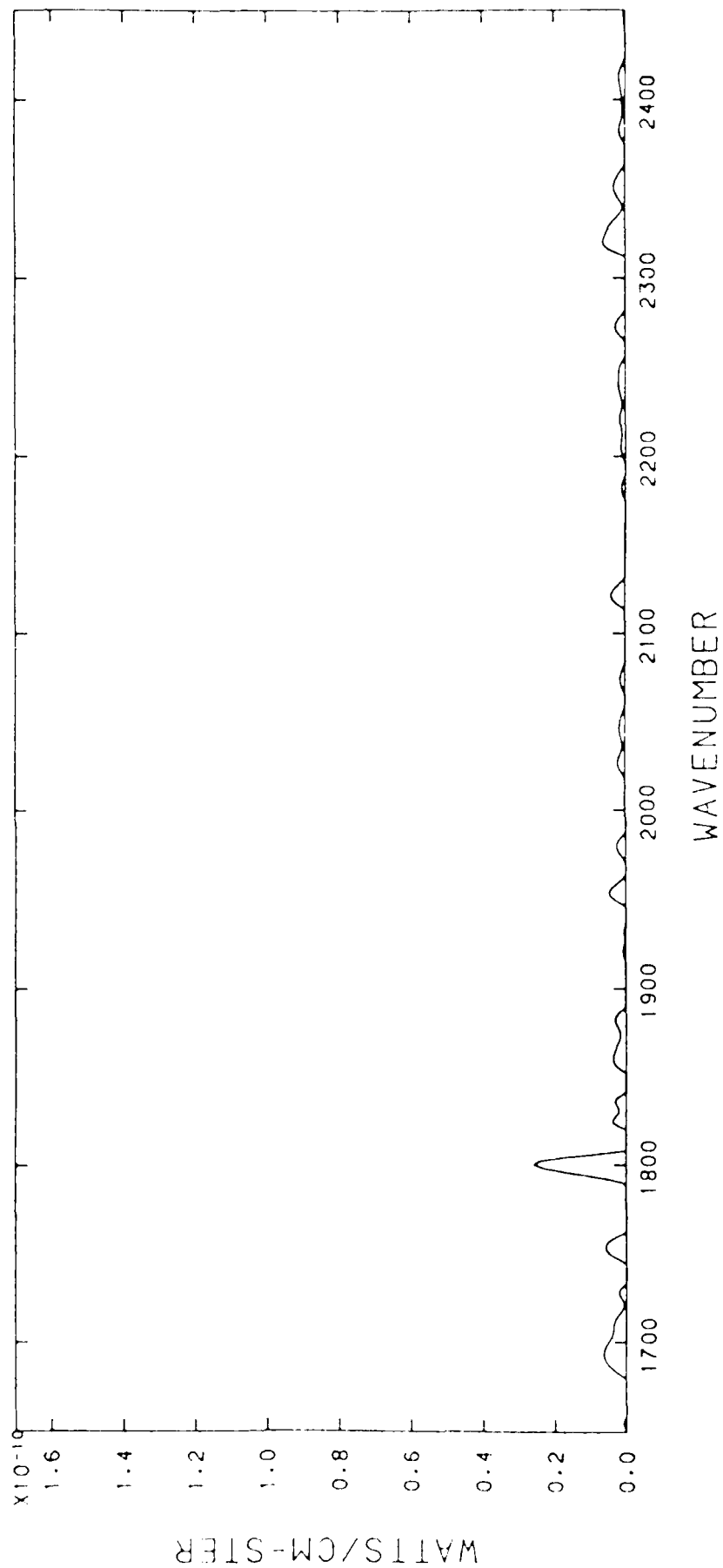
WAVENUMBER

FILE 137. TIME 9:11:25.116. ALT 77.2- 76.8 KM

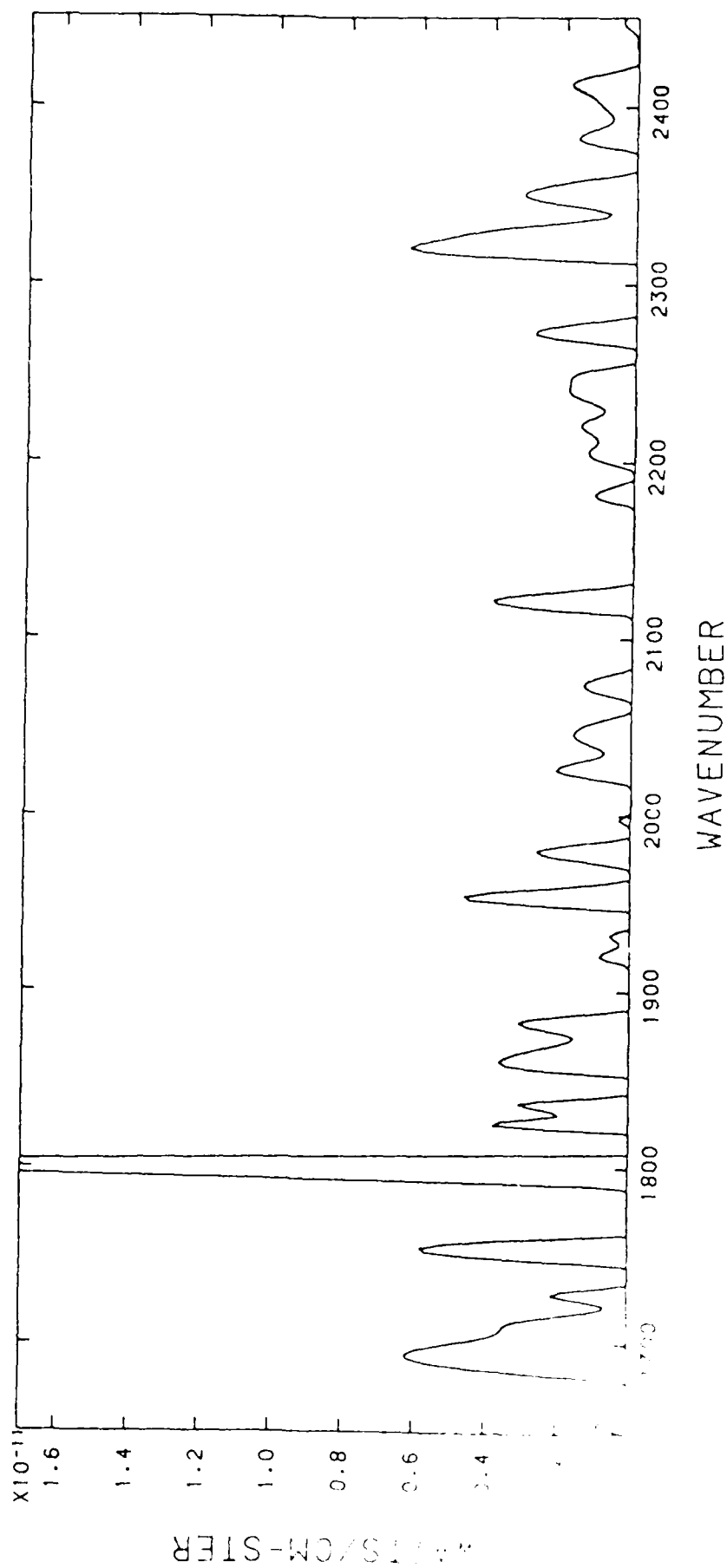
30-MAY-83 09:37



FILE 137, TIME 9:11:25.116, ALT 77.2- 76.8 KM



FILE 138, TIME 9:11:26.726, ALT 75.4- 75.0 KM



738, TIME 9:11:26.726, ALT 75.4- 75.0 KM

AD-A181 164

CATALOG OF LOW RESOLUTION INFRARED SPECTRA:  
FIELD-WIDENED INTERFEROMETER (U) UTAH STATE UNIV LOGAN  
SPACE DYNAMICS LABS R H HAYCOCK ET AL 26 JUN 85

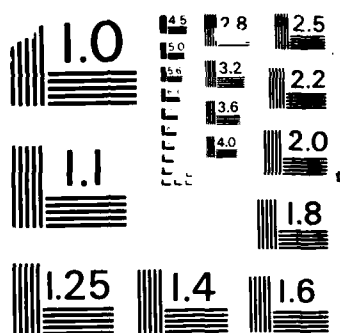
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SDL/85-046 AFGL-TR-85-0162 F19628-83-C-0056 F/G 20/6

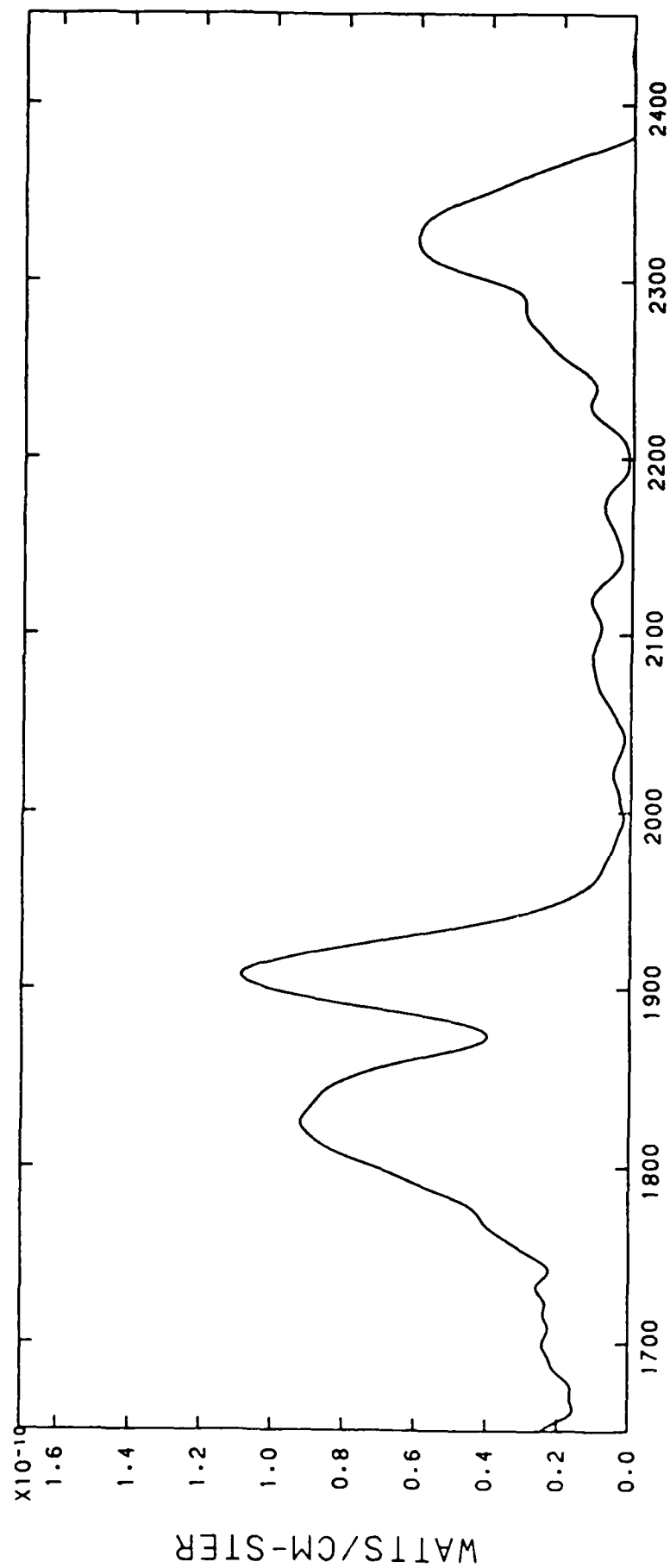
NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

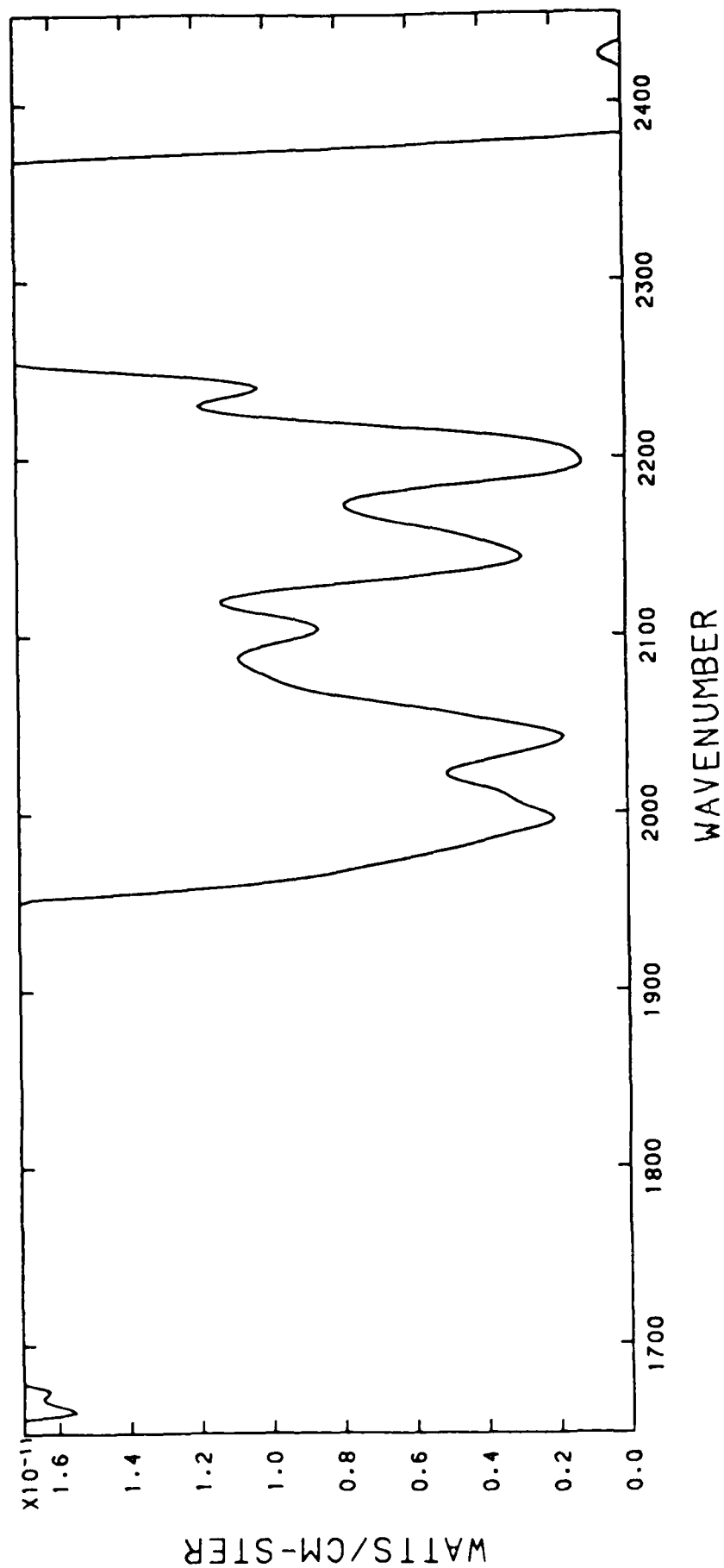




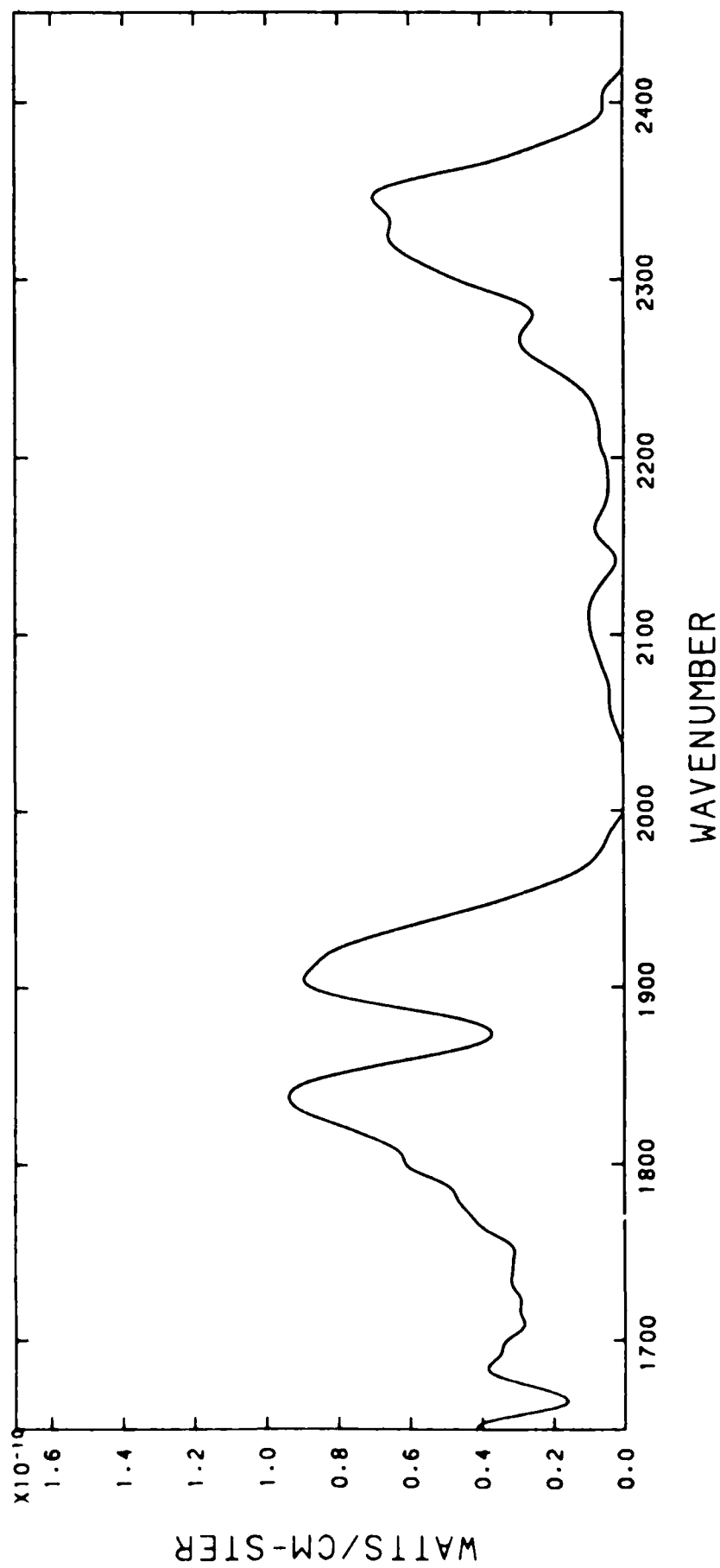
WAVENUMBER

FILE 139, TIME 9:11:28.368, ALT 73.6- 73.2 KM

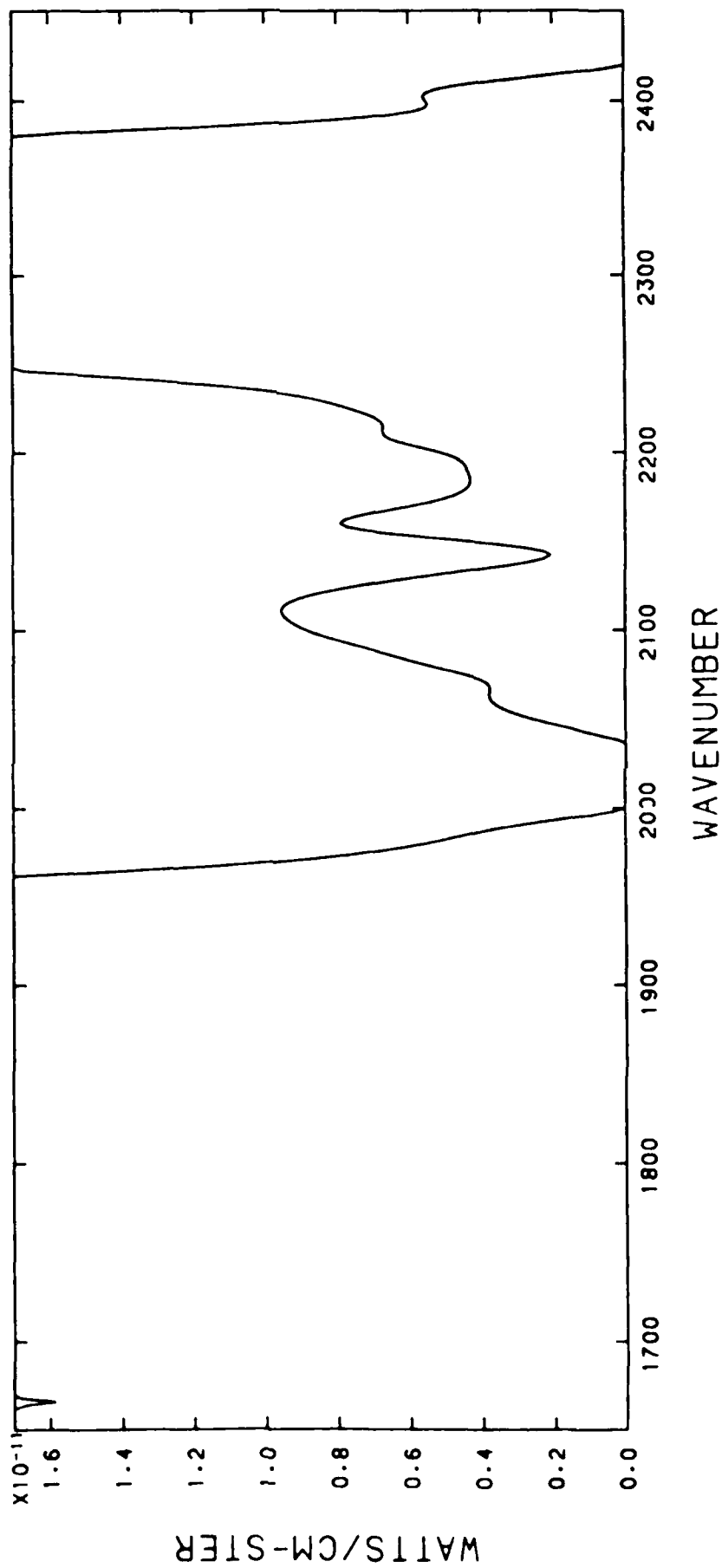
30-NOV-83 09:37



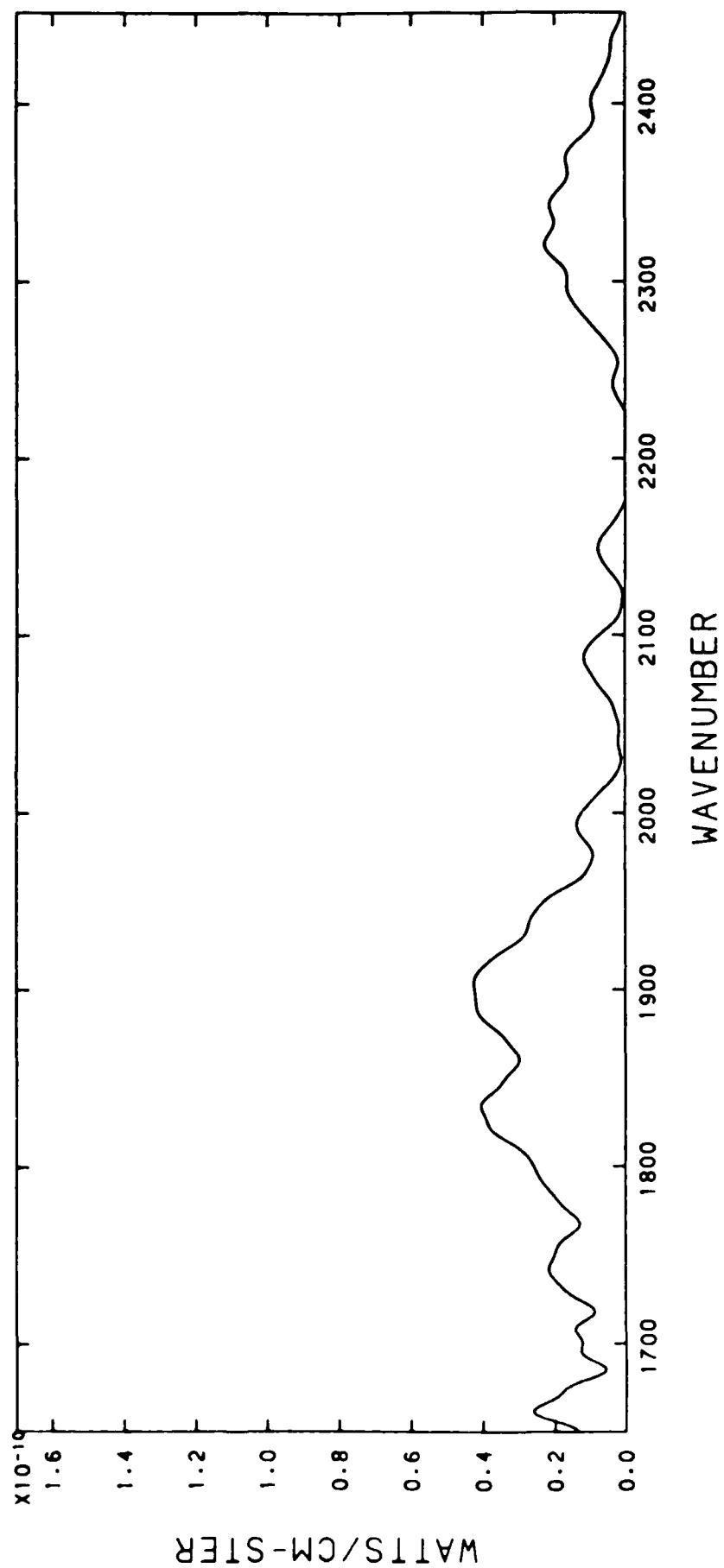
FILE 139, TIME 9:11:28.368, ALT 73.6- 73.2 KM



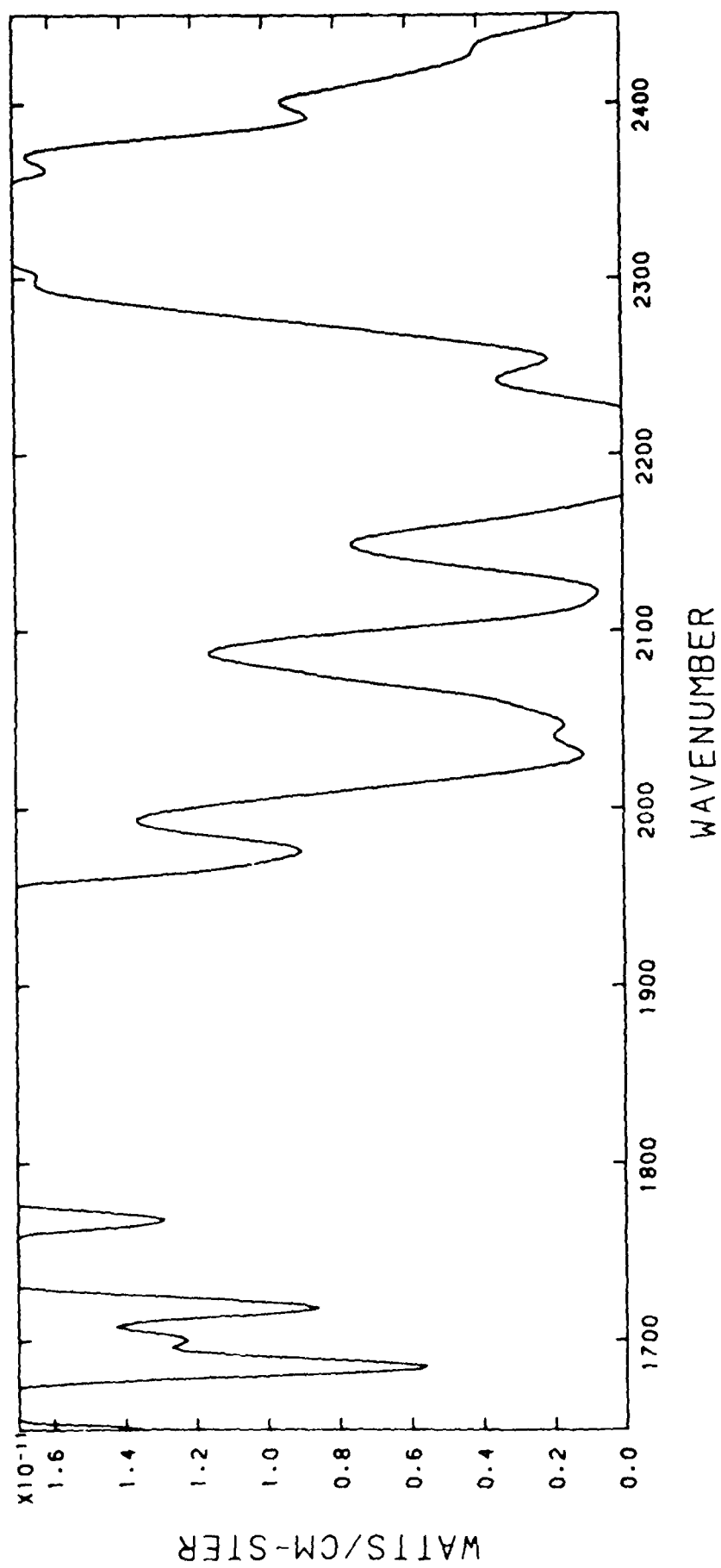
FILE 140, TIME 9:11:31.126, ALT 70.5- 70.1 KM



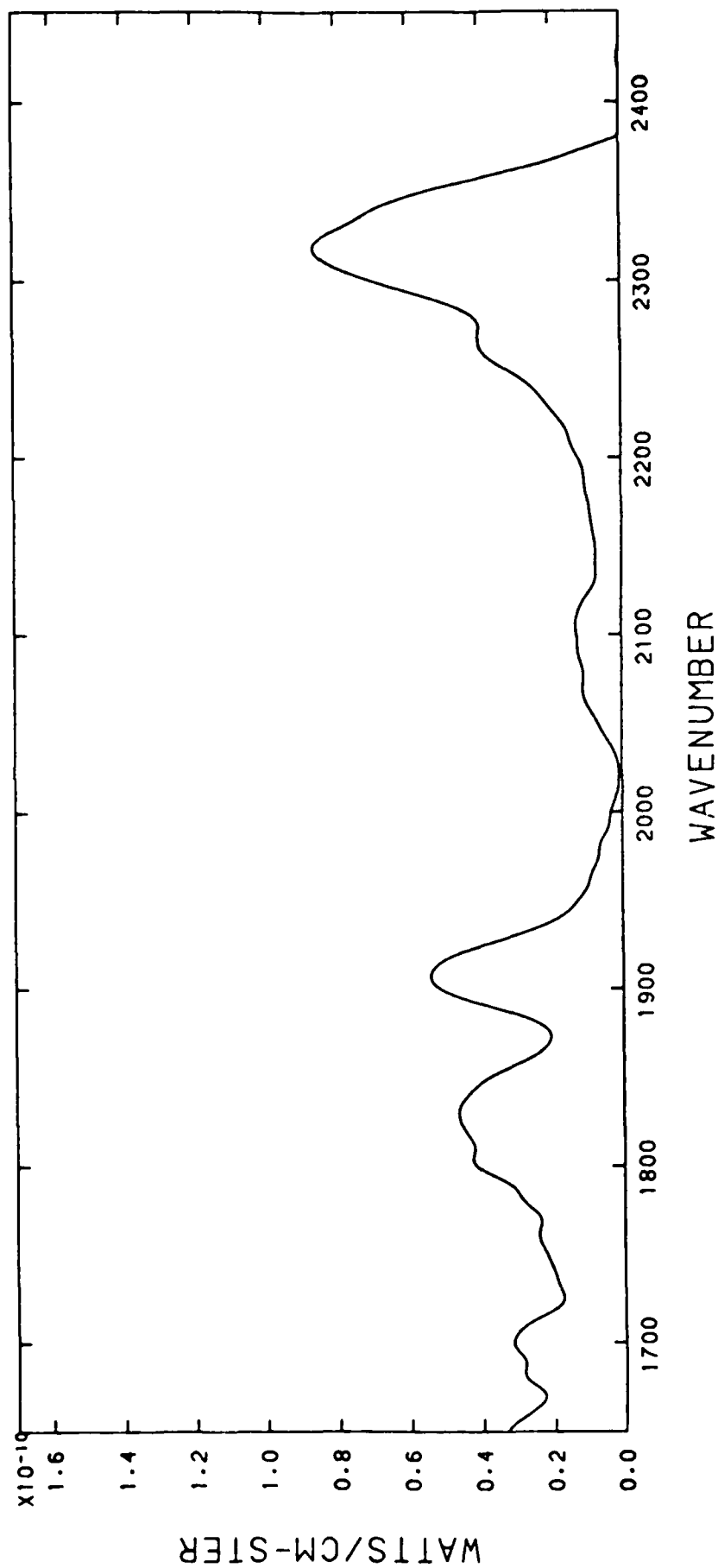
FILE 140, TIME 9:11:31.126, ALT 70.5- 70.1 KM



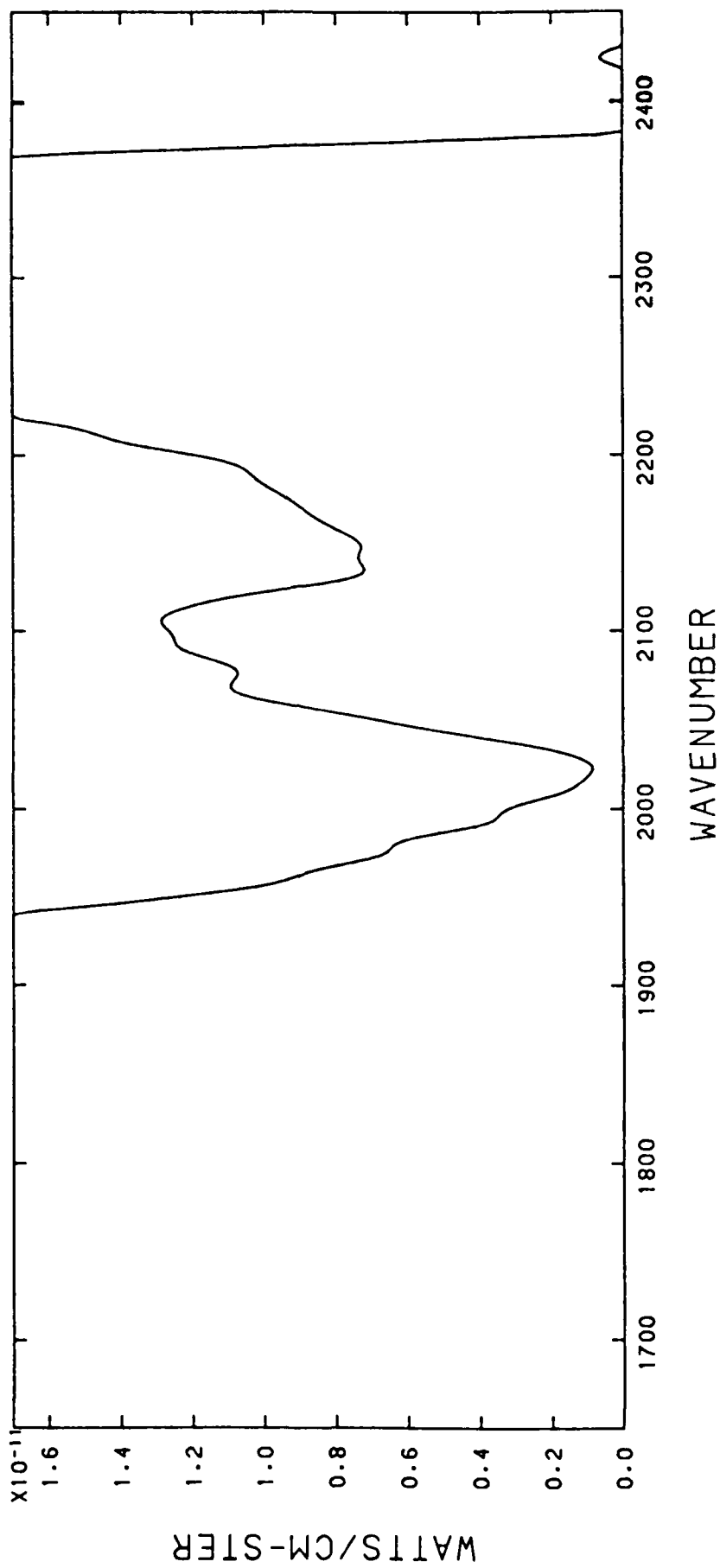
FILE 141, TIME 9:11:31.624, ALT 69.9- 69.5 KM



FILE 141, TIME 9:11:31.624, ALT 69.9- 69.5 KM

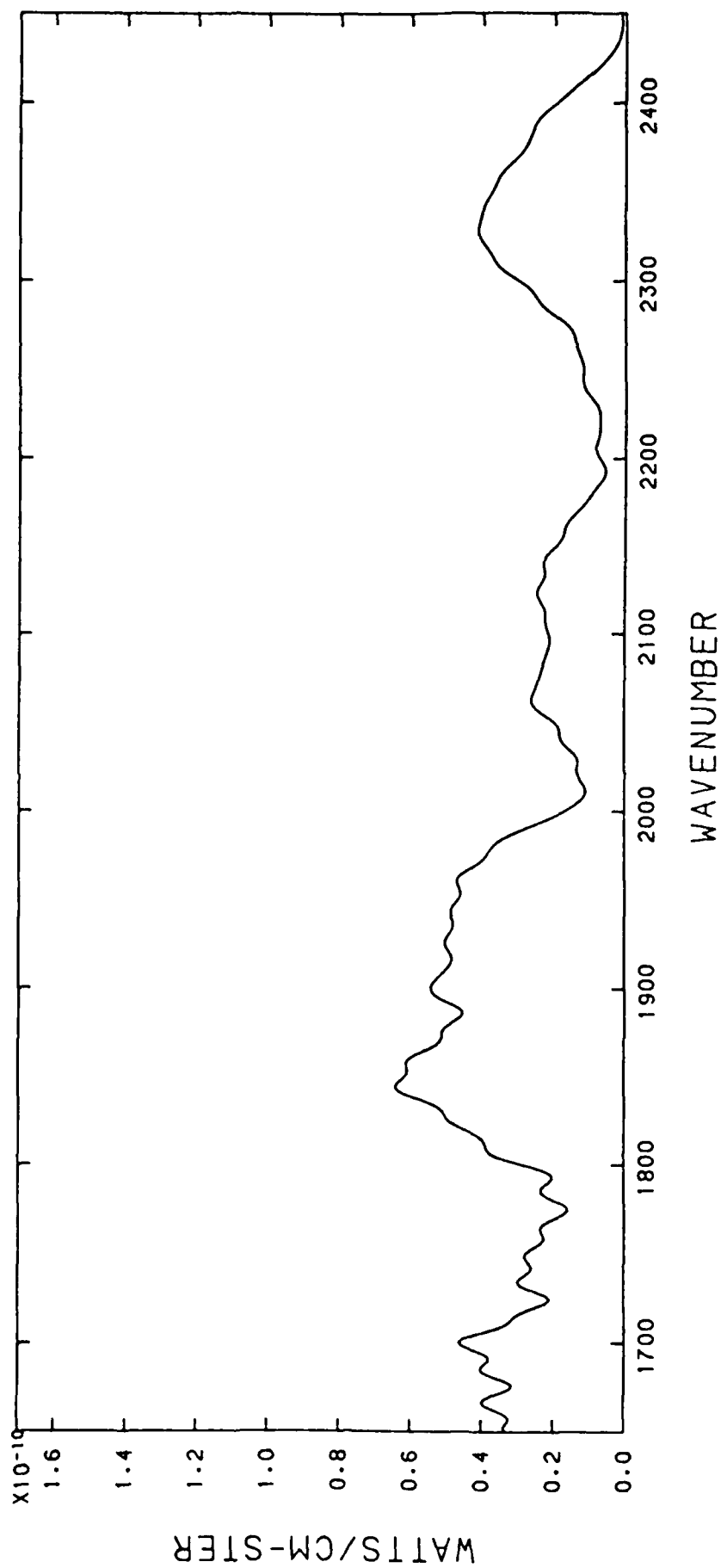


FILE 142, TIME 9:11:34.380, ALT 66.7- 66.3 KM

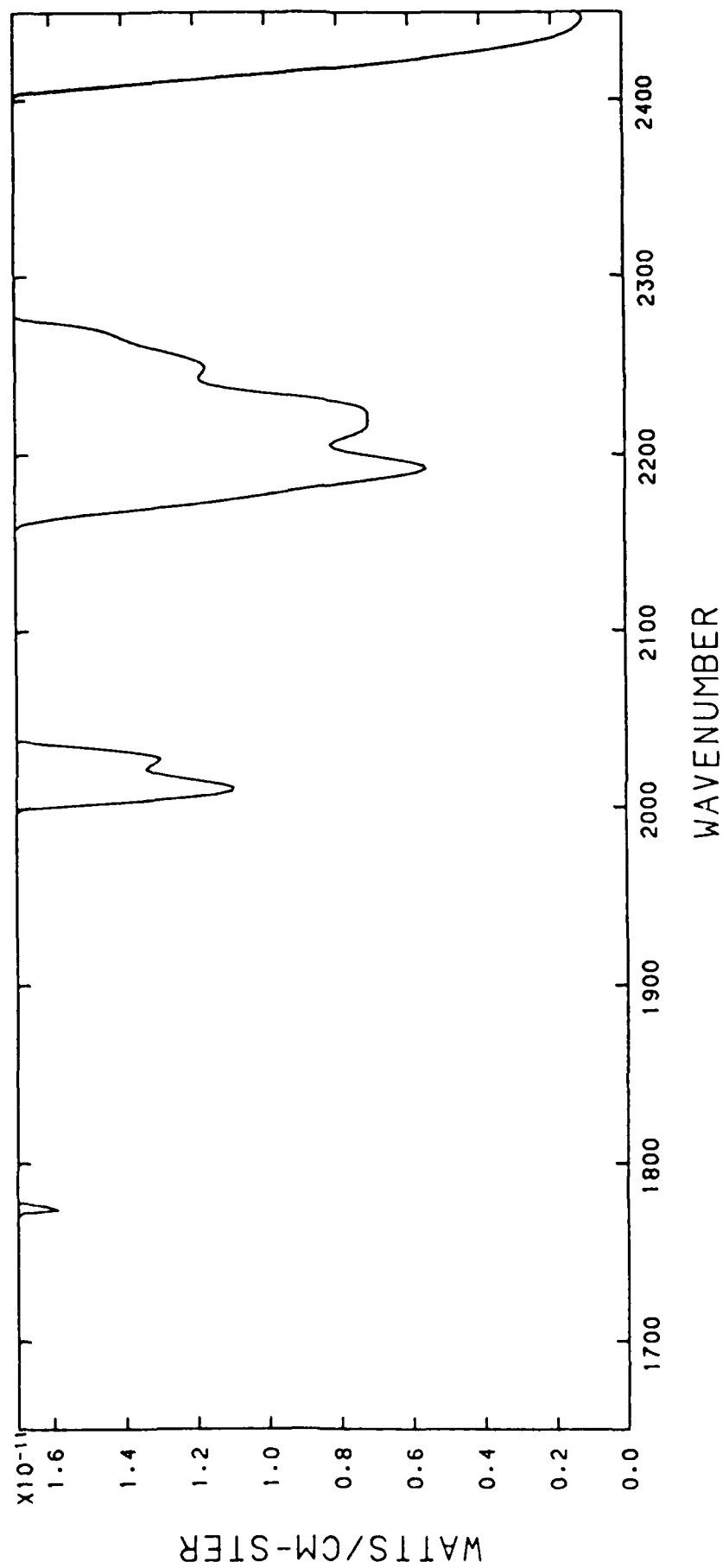


FILE 142, TIME 9:11:34.380, ALT 66.7- 66.3 KM

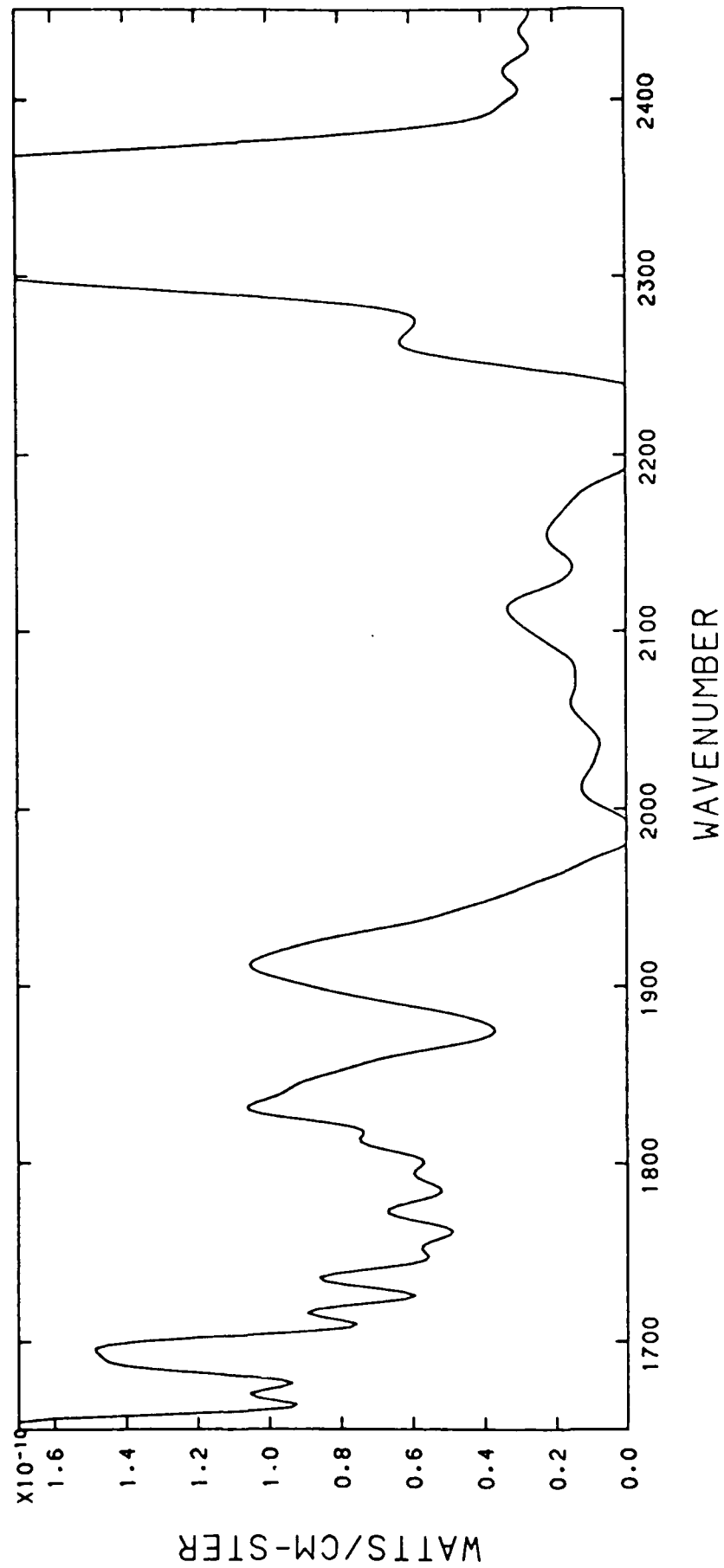




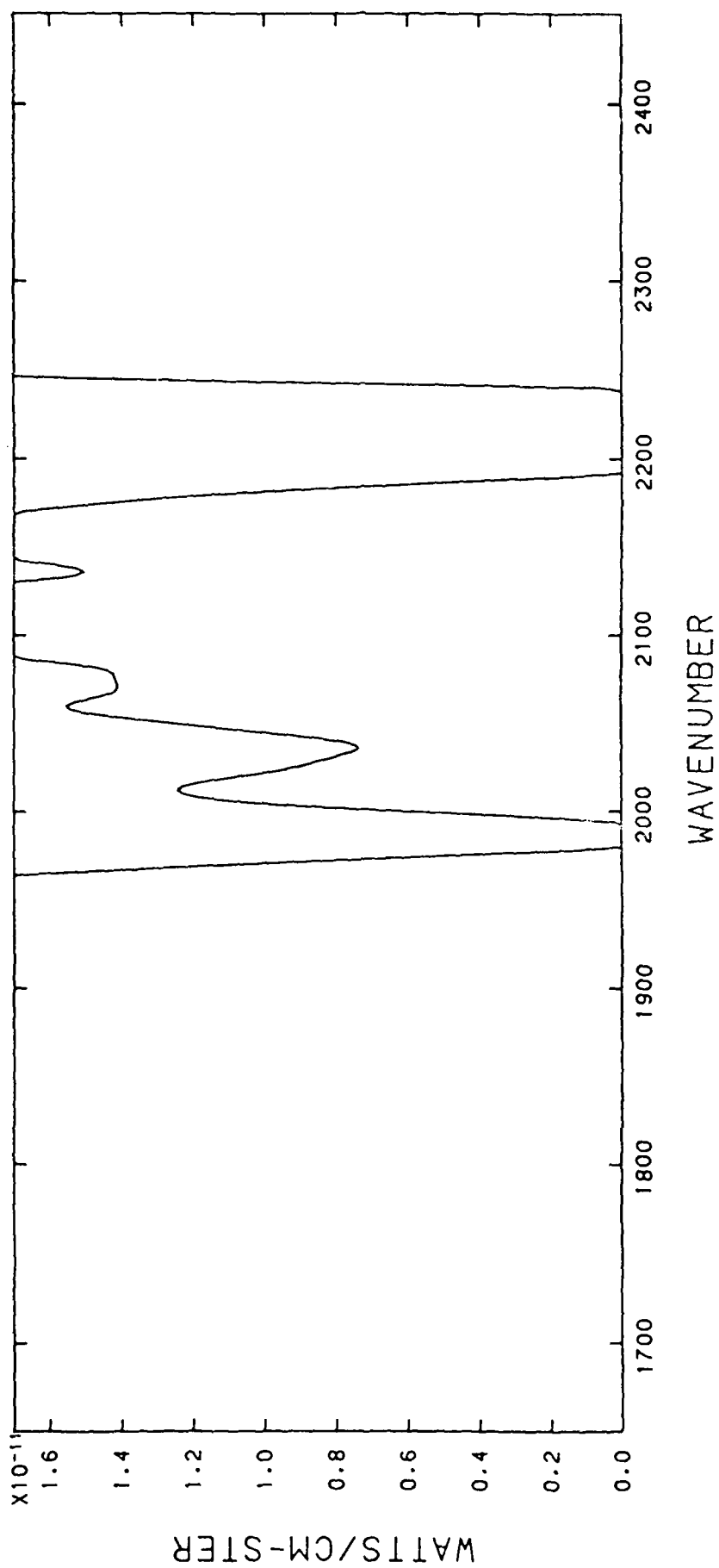
FILE 143, TIME 9:11:34.876, ALT 66.2- 65.8 KM



FILE 143, TIME 9:11:34.876, ALT 66.2- 65.8 KM

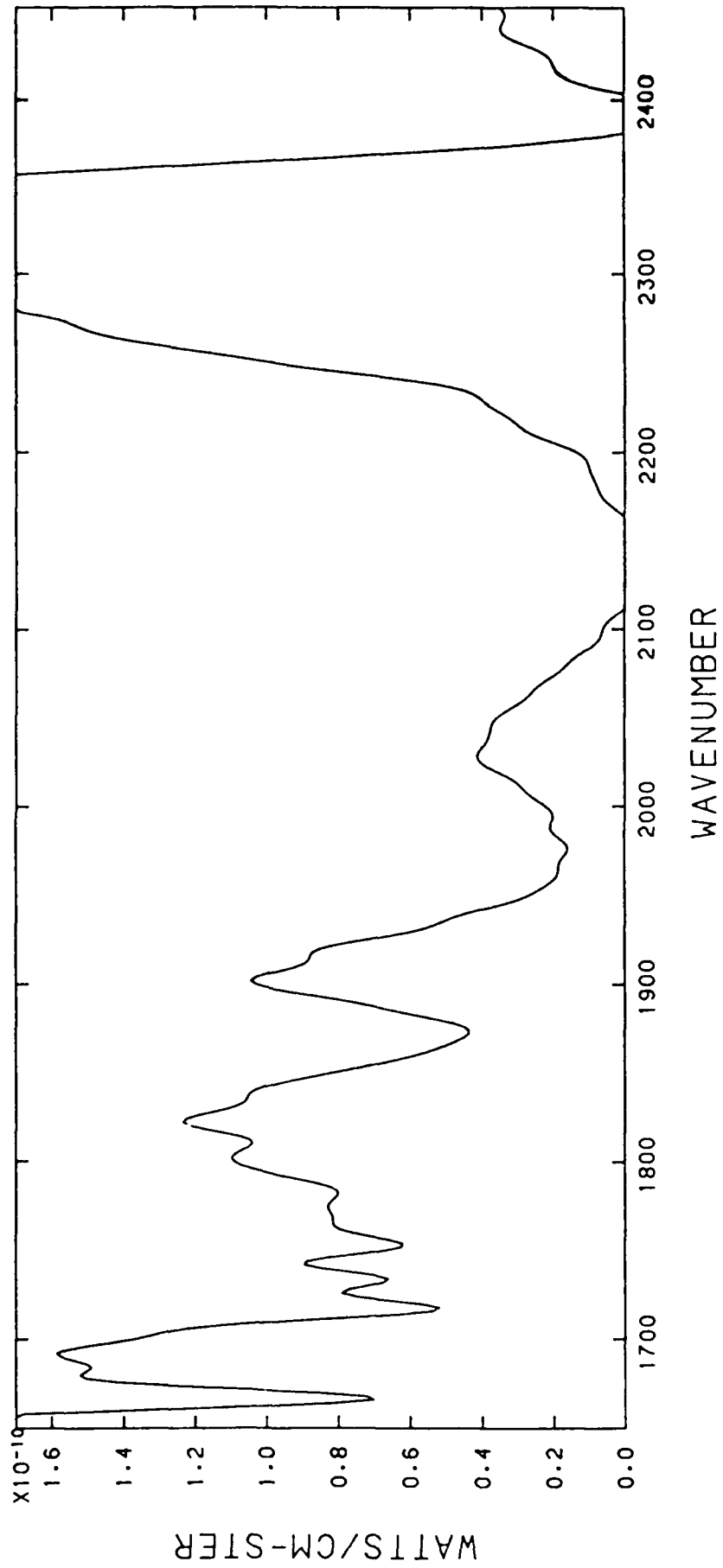


FILE 144, TIME 9:11:37.640, ALT 62.9- 62.5 KM



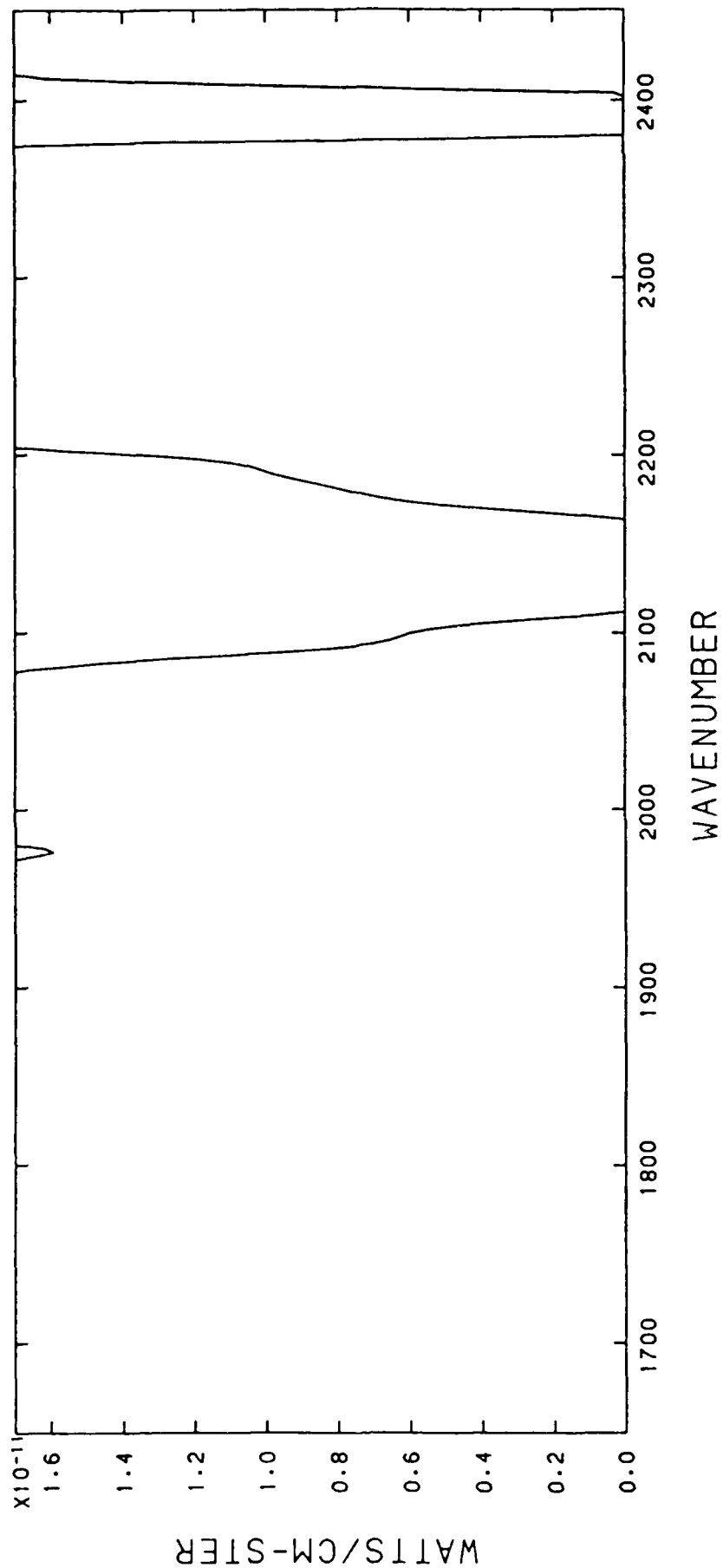
FILE 144, TIME 9:11:37.640, ALT 62.9- 62.5 KM

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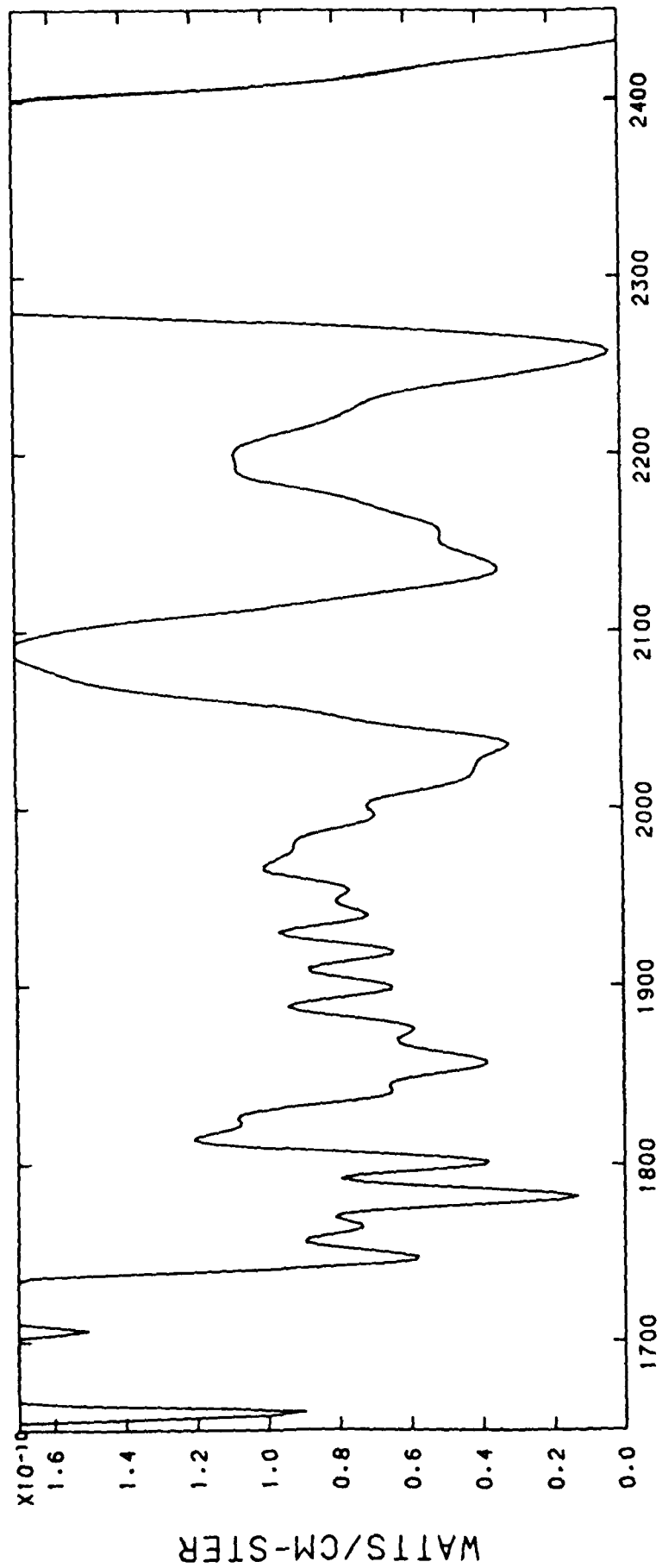


FILE 145, TIME 9:11:38.140, ALT 62.3- 61.9 KM

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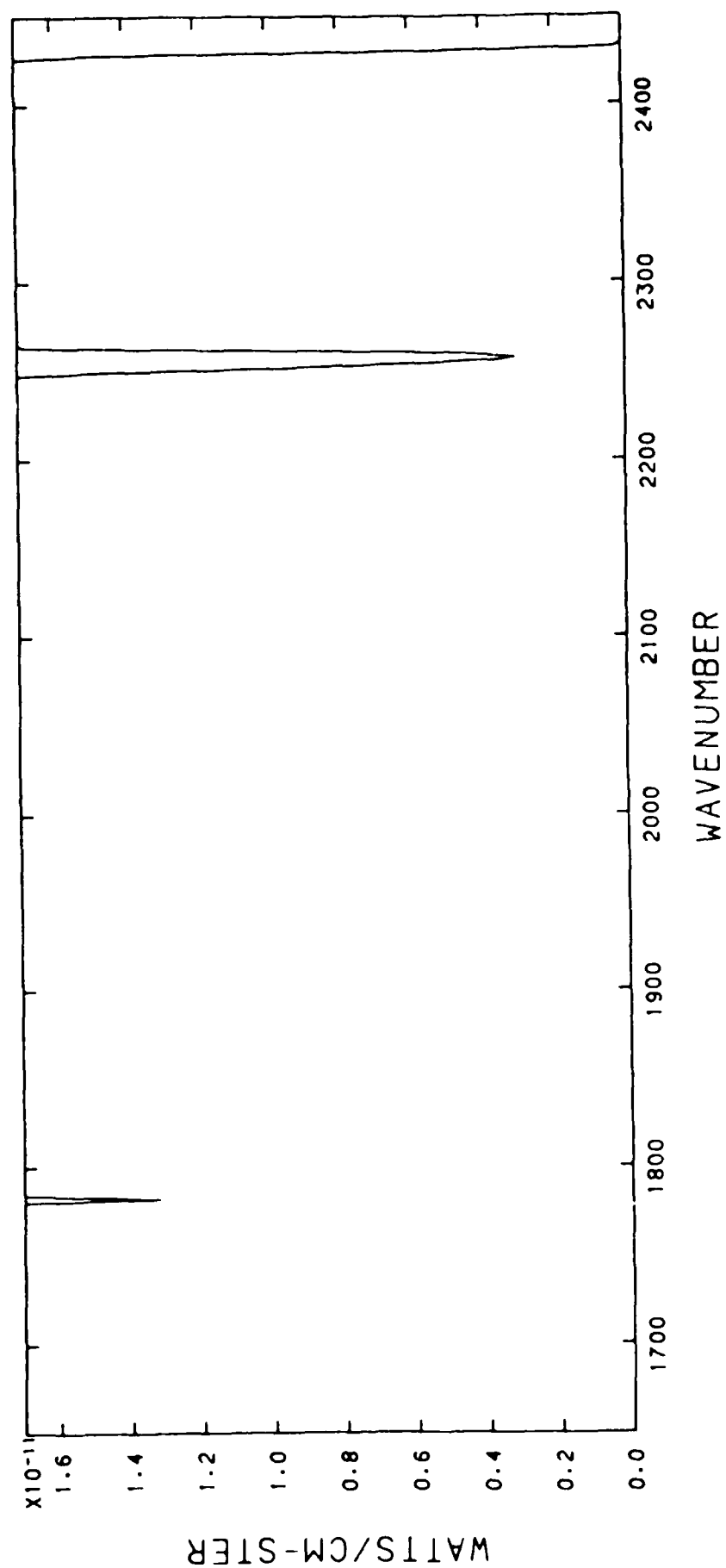
FILE 145, TIME 9:11:38.140, ALT 62.3- 61.9 KM



WAVENUMBER

FILE 146. TIME 9:11:40.910. ALT 58.9- 58.5 KM

30-NOV-83 09:38



FILE 146, TIME 9:11:40.910, ALT 58.9- 58.5 KM

30-NOV-83 09:38

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